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Physical Impairment Among One Thousand Negro Workers*

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TWO years ago at the annual meeting of the Industrial Hygiene Section, we presented a summary of our findings dealing with the first of a series of Life Conservation Studies: Physical Impairment among 1,000 White Male Office Workers.[1] Last year we reported before this section on the second group in this series under the title: A Report on 1,000 Physical Examinations of (White) Machine and Hand Tool Operators.[2] In the interim a third group: 1,000 Negro Factory Workers, has been examined. We are presenting in this report some of the more important findings derived in the study of the negro factory workers group.

Procedures attending examinations and subsequent steps in tabulating data for the 3 groups have been followed with a minimum of variation in order that the findings might be trustworthy of comparison. As these studies have progressed, a few items have been added to the physical examination schedule each year, but the basic standards for physical measurements and defections† have been precisely followed throughout the series.

The circumstances under which the present study was undertaken were somewhat different from those of either of the preceding ones. It was the outcome of particular concern on the part of the Public Health Federation and the Anti-Tuberculosis League of Cincinnati in the health of the negro. These organizations, desiring to learn more

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixtieth Annual Meeting at Montreal, Canada, September 16, 1931.

† See *Statistical Report* for plan and purposes of the Life Conservation Series. Standards will be found in Appendix II of statistical report. Copies of this report may be obtained from the Heart Council, 312 West Ninth Street, Cincinnati, O.

about the health of the negro in industry and seeing through the Heart Council's Life Conservation Series an opportunity for scientific study, decided to coöperate in conducting the examinations of 1,000 negro men in industry through the Heart Council.

The group under consideration comprised 1,032 negro men all of whom voluntarily submitted themselves for examination. They were drawn from the rank and file of those employed in the manufacture of metal products, roofing, cotton products, chemical fertilizer, leather goods, and glass products. Thirteen factory groups in the Cincinnati metropolitan area were included in this survey. Our only requirement of examinees was that they be 20 years of age or over.

We have been particularly interested in determining through this series of studies factors involved in the heart disease situation common to later years of life. It has been our desire, therefore, to select a large proportion of men past 40 years in each group. In the clerical group only did we succeed to any extent. Here three-fourths of the men were between 30 and 55. In the white industrial workers group, on the other hand, three-fourths of the men were under 45, and in the negro factory workers group, more than three-fourths (79.8 per cent) were under 45. In spite of our efforts to include older men in these groups, we failed for the reason that they are not to be found in large numbers in industrial work in Cincinnati.

GENERAL CONSIDERATIONS

In order that the findings may be given a proper background, it is worthwhile to consider briefly some of the social, economic, and health aspects of negro life in Cincinnati. The negro industrial worker, like others employed in industry, spends two-thirds of his time in an environment common to other members of his family, and it is to this period, aside from working hours, that we must charge many of the ills that befall him.

In the last 10 years Cincinnati's negro population has increased from 7 to 11 per cent, due in large proportion to an influx from southern states. Practically none come to jobs awaiting them; they must seek employment, and the wage scale of those employed is in general low. A considerable number of negroes are to be found idle at any time. Fully 90 per cent are sheltered under conditions of over-crowding with meager facilities for sanitation and comfort. Most of their small earnings are spent for foods and luxuries. Many exist on grossly imbalanced diets, and even though a family of 5 may be living in one room, a radio will usually be found among the furnishings and a dilapidated automobile somewhere near the dwelling. Clothing is often in-

adequate to protect against the cold and dampness. Medical attention is usually sought as a means of cure rather than prevention, even though clinic facilities are accessible either without cost or for a small fee.

The average negro is a care-free sort of person who gives little thought to the future so long as he feels well, has plenty to eat, a place of shelter, and can indulge in the social life of his choice. It is in all likelihood this method of living, with little thought of restraint and less concern about the ill-effects, that accounts for the inception of many of the physical ills to which negroes fall heir. From what information we have been able to gather, we are inclined to believe that with a knowledge and effective application of personal hygiene in a favorable environment, this race can materially lower its morbidity and mortality rates to the point where they will compare favorably with those of the white population. It is not likely, in our opinion, that racial susceptibility or some other unidentified factor can account for excessive morbidity and mortality rates among negroes from certain well known causes.

The mortality experience from tuberculosis during 1930 in two contiguous census tracts in Cincinnati, each with a considerable negro population, shows an interesting contrast. In tract 36, in the group of 4,131 negroes of a poor class, the mortality rate from tuberculosis was 290 per 100,000 population. In tract 37, there were no deaths from tuberculosis among its negro population of 1,763, which is made up of the highest class of negroes in the city.

As a further example, by way of contrast, let us compare the mortality rates for certain principal causes during 1930 among a poor class of whites in tract 5, with those for a high class of negroes in census tract 37:

TABLE I

MORTALITY RATES IN 1930 FOR WHITE POPULATION IN CENSUS TRACT 5, AND FOR COLORED POPULATION IN TRACT 37, CINCINNATI

	White rates, Tract 5 per 100,000	Col. rates, Tract 37 per 100,000
Tuberculosis (all forms)	673	0
Cardiovascular diseases	300	965
Pneumonia	224	170
Cancer	75	340
Apoplexy	150	170
Nephritis	139	170
Deaths under 1 year per 1,000 live births	172.4	71.4
Diarrhea and enteritis under 1 year per 1,000 live births	103.5	35.8

In Table I it will be noted that mortality rates for diseases common

to older age groups are consistently higher for negroes. On the other hand, rates for causes more common to or exclusively among younger age groups are notably lower for negroes. There is in this experience an indication that, through more favorable conditions of living and through proper enlightenment, mortality among negroes can be materially lowered.

EXAMINATION FINDINGS—1,000 NEGRO WORKERS

Those negroes drawn for purposes of our study out of the mass employed in Cincinnati industries represent in the main the poorer classes. In the course of examining these men we anticipated that in the aggregate a high per cent of physical defection would be found. Actually, only 1 out of the 1,000 men was considered to be essentially free of physical defects. To many a physical examination was a new experience. The striking fact was that out of 999 men with defects, only 8 knew or admitted knowing of their existence prior to the examination. In the opinion of the examiners, 911 of the group would profit by early medical care. For purposes of summarizing, physical defects were classed as major or minor.* Examinees with major defects outnumbered those with minor nearly 10 to 1. Among those 25 years of age and under, 87.5 per cent had major physical defects which increased in frequency up to 50 years. Beyond 50 years, all men examined were found to have major physical defects.

Space will not permit entering into the discussion of all the items listed in the tabulation of physical findings. We shall therefore consider only those dealing with cardiovascular lesions and correlations, and pulmonary findings.

CARDIOVASCULAR LESIONS

One of the most striking situations in the group of 556 men with significant cardiovascular abnormalities was the high incidence of hypertension, 249, a conspicuous number of whom were under 40. Up to 30 years, 13.8 per cent of all men examined, and between 30 and 40, 21.5 per cent had elevated blood pressures. The curve by age for incidence of hypertension in this group is higher for men over 30 years than those based on insurance statistics and on findings in other similar surveys that have come to our attention. Second readings on a fair sample of examinees (120) previously found to have elevated blood pressures gave when correlated with first readings a fairly high index of reliability of the initial records, viz., $0.717 + 0.03$ as the probable error.

* See *Statistical Report*, Appendix II, for standards governing these classifications.

TABLE II

SUMMARY OF PHYSICAL FINDINGS—1,000 NEGRO FACTORY WORKERS

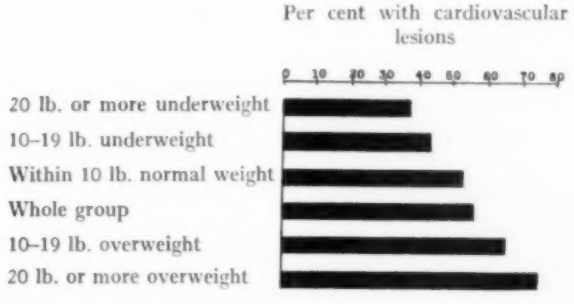
	No. involved
Weight	
10 lb. or more overweight	358
10 lb. or more underweight	275
Vision	
20/30 or more in one or both eyes	508
Dental defects	787
Defective hearing	107
Enlarged thyroid	39
Significant cardiovascular lesions	556
Cardiac enlargement	249
Valvular lesions	125
Myocardial insufficiency	68
Hypertension	249
Hypotension	119
Arteriosclerosis (marked)	11
Pulmonary defects	82 *
Hernia	147
Hemorrhoids	147
Dermatoses	212
Flat feet	816
Traumatic deformities, extremities	22
Albuminuria	170
Glycosuria	4
Wassermanns positive	300 †

* Findings incomplete.
† Estimated on basis of 83 positives (+++ and ++++) out of 362 Wassermanns obtained.

Weight and Cardiovascular Lesions—In our Life Conservation Series totalling thus far 3,000 men, there has been a consistently greater incidence of cardiovascular impairment among those overweight. In the negro group, this relation is shown in Figure I. In this group,

FIGURE I

WEIGHT AND CARDIOVASCULAR ABNORMALITIES IN 1,000 MALE NEGRO FACTORY WORKERS

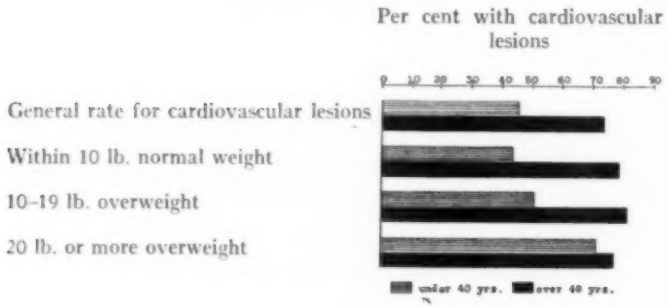

Per cent with cardiovascular lesions
0 10 20 30 40 50 60 70 80
20 lb. or more underweight
10–19 lb. underweight
Within 10 lb. normal weight
Whole group
10–19 lb. overweight
20 lb. or more overweight

among men under 40 years, the greater the amount of overweight, the higher the incidence of cardiovascular abnormalities found—as re-

vealed in Figure II. Over 40 years there appeared to be little relation between weight status and cardiovascular abnormalities.

FIGURE II

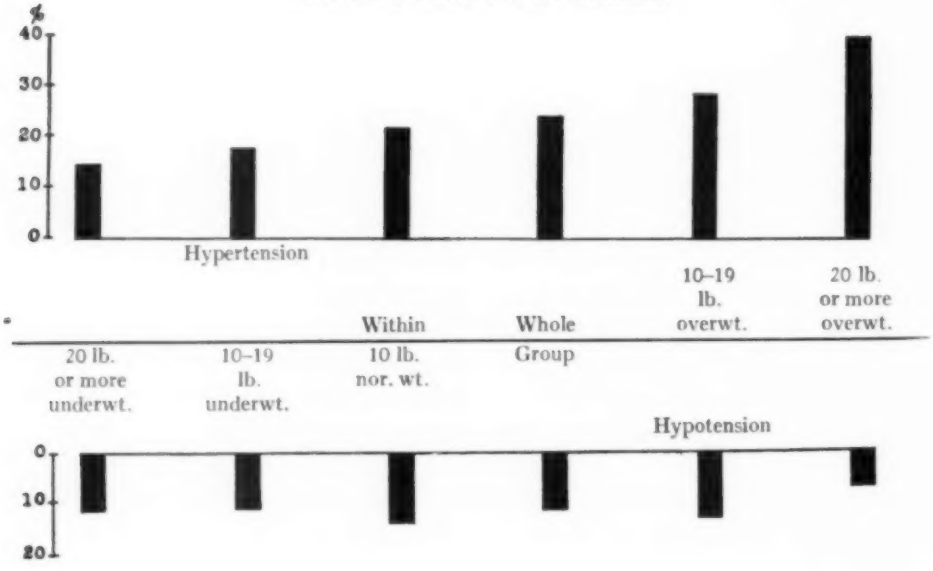
OVERWEIGHT AND CARDIOVASCULAR ABNORMALITIES
IN
1,000 NEGRO MALE FACTORY WORKERS
UNDER AND OVER 40 YEARS


Per cent with cardiovascular lesions
0 10 20 30 40 50 60 70 80 90
General rate for cardiovascular lesions
Within 10 lb. normal weight
10–19 lb. overweight
20 lb. or more overweight
under 40 yrs.
over 40 yrs.

Again it was observed, as in the previous two groups, that hypertension existed among more men who were overweight than among those of other weight status. Of examinees 20 lb. or more underweight, 14.8 per cent had elevated blood pressures, 22 per cent within 10 lb. of normal weight were similarly involved, while of those 20 lb. or more overweight, 39.5 per cent were found with high blood pres-

FIGURE III

WEIGHT AND ABNORMAL BLOOD PRESSURES
IN
1,000 MALE NEGRO FACTORY WORKERS



sures. The incidence of abnormal blood pressures and weight status is shown in Figure III.

Urine Findings and Cardiovascular Lesions—Not only have these relations between overweight and cardiovascular lesions been noted, but the incidence of albuminuria has been consistently higher among men with cardiovascular lesions. The frequency with which albuminuria was determined for the negro group was notably high.

TABLE III

ALBUMINURIA AND CARDIOVASCULAR LESIONS IN 3,000 MALE INDUSTRIAL WORKERS

Groups Examined	Rate per 1,000 with Albuminuria among those: With no cv. lesions	With cv. lesions
I. White clerical workers	1.4	2.5
II. White machine and hand tool operators	3.6	6.1
III. Negro factory workers	13.4	20.0

The outstanding communicable disease problem among Cincinnati negroes is tuberculosis, which led all other causes of death during 1930. Of all colored deaths from tuberculosis in this period, 22 per cent occurred under and 78 per cent over 20 years of age. Tuberculosis is not only claiming more victims past 20 years than formerly, but the highest incidence of mortality is advancing into age groups around 40 years.

It might be surmised that the incidence of tuberculosis in male negro labor groups would be low because few with the disease could long endure the physical strain, but this disease does exist to an appreciable extent among this type of workers. The Anti-Tuberculosis League of Cincinnati has completed chest X-ray examinations upon 280 negro factory workers and in 2 definite evidence of active tuberculosis was revealed, while in 11 others the disease was suspected—an incidence of 7 per 1,000 with active tuberculosis, and 39 per 1,000 suspected of having the disease. Below 40, the X-ray revealed 31.5 per cent of the 280 men with some form of pulmonary pathology, and over 40 years 43 per cent were involved. The average age where tuberculosis was either found or suspected was 37 years.

This study is at present limited. The Anti-Tuberculosis League hopes to increase the series of X-rays to involve at least 500 of the men originally examined. From what has been learned in our contact with negroes, with this group as a whole and the roentgenologic studies of it in part, we believe that tuberculosis must not be overlooked as a source of physical impairment in dealing with the industrially employed negro.

GENERAL COMMENT

Among 1,000 male negro industrial workers, only 1 was found to be essentially free of physical defects, and for the remainder, major defects predominated. In view of this situation, we wonder how these men can endure moderate to great amounts of physical effort exacted of them. As a matter of fact, many do not long endure; they suffer physical breakdown relatively early in life. Even now the toll is so great among these people from tuberculosis, syphilis and the degenerative diseases that comparatively few reach old age.

Our experience thus far shows that the ratio of rates for cardiovascular lesions between white and colored men examined bears a close relation to the ratio of local mortality rates between the two races. In our studies I and II, we found that 33.5 per cent of the two groups had significant circulatory defects, while in the negro group 55.6 per cent were involved. This means that the colored rate was 1.6 times the white. The general mortality rate from circulatory diseases over a 10-year period ending 1929 averages for negroes 1.7 times that for whites. In 1930, the year during which this study was made, we find an even closer correlation in the incidence of these rates:

RATES PER 1,000 MALES OVER 20 YEARS FOR CARDIOVASCULAR LESIONS FOUND IN 3,000 EXAMINED MEN AND MORTALITY RATES FROM CARDIOVASCULAR DISEASES PER 1,000 MALE POPULATION OVER 20 YEARS IN CINCINNATI DURING 1930

	Mortality per 1,000	Cardiovascular lesions per 1,000 examined
White	33.0	33.5
Colored	55.9	55.6

In general it may be predicted, on the basis of this survey and other information, that a very large amount of physical impairment probably exists in the negro race. Moreover, the small sample on which our observations have been based shows a considerable amount of significant physical impairment in male labor groups under 40.

This situation is not without hope of improvement. We find in the recent mortality records of small groups of negroes in a higher economic class, and in favorable environment, an indication of definite improvement. Morbidity and mortality rates among negroes can, we believe, be lowered to the point where they will compare favorably with those for whites. This may eventually come to pass, but there will be many social, economic, and health problems to be dealt with in realizing the accomplishment.

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1. Abstract. *A. J. P. H.*, 20, 1: 85 (Jan.), 1930.
2. Abstract. *A. J. P. H.*, 21, 2: 201 (Feb.), 1931.

Effect of Lead Arsenate Spray on the Composition and Vitamin Content of Oranges*

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GRAY and Ryan[1] in California, and Juritz[2] in South Africa, in studying the effect of arsenic sprays on oranges found a marked reduction of acidity in the ripe fruit. Juritz also found a diminution of sucrose from 4.14 to 1.12 gm. per 100 c.c. of juice in heavily treated trees, total sugar changing only from 9.77 to 7.26 gm. per 100 c.c. of juice. In 1927 Hawkins and Barger[3] reported that they had confirmed the results of Gray and Ryan and stated that in 1893 it was reported to the Florida State Horticultural Society that spraying with a mixture of bisulphate of soda and arsenate of lime would produce a sweet orange.

Yothers[4] showed that the change in composition of the fruit is altered by a single spraying at or shortly after blossoming time. Notwithstanding the fact that the change in the chemical composition of the fruit was definitely established 10 years ago, there have been no thorough investigations dealing with the function of arsenic in bringing about a deranged metabolism of the plant. Recently Copeman,[5] on the basis of chemical evidence, has postulated that lead arsenate appears to produce a selective oxidation in which the citric acid is oxidized in preference to cell wall material.

It seemed desirable to obtain further information with respect to the extent of chemical changes produced by different degrees of spraying and to ascertain if spraying had any effect on vitamin content of the fruit. The extensive use of arsenical sprays to prevent insect infestation in Florida at the time this work was planned made these investigations advisable. To prevent spread of the Mediterranian fruit fly into uninfested areas certain fruits were subjected to a method of processing under supervision of the Plant Quarantine and Control Ad-

* Read before the Food, Drugs and Nutrition Section of the American Public Health Association at the Sixtieth Annual Meeting at Montreal, Canada, September 15, 1931.

TABLE I

CHEMICAL ANALYSIS OF NORMAL FRUIT, NOT SPRAYED, NOT PROCESSED
LOT 1

	Weight of Orange	Volume of Juice	Per Cent Juice	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	Per Cent Acid in Fruit	pH Value
	gm.	c.c.	%	%	%		%	
As received	291	173	59.5	11.0	0.94	11.7	0.583	3.6
	298	154	51.7	11.2	1.12	10.0	0.610	3.4
	250	163	65.2	11.6	0.88	13.2	0.636	3.6
	213	130	61.0	10.9	0.81	13.5	0.512	3.8
	222	122	55.0	11.5	1.02	11.3	0.589	3.5
	260	155	59.6	11.5	1.04	11.1	0.656	3.5
	248	152	61.3	11.2	0.97	11.5	0.666	3.6
	253	151	59.7	11.0	0.84	13.1	0.525	3.7
	221	115	52.0	11.8	0.78	15.1	0.426	3.6
	242	147	60.7	11.6	1.00	11.6	0.637	3.5
Average	250	146	58.6	11.3	0.94	12.2	0.584	3.6
After 30 days Storage	237	123	51.9	12.6	0.98	12.9	0.535	3.8
	248	127	51.2	12.7	1.00	12.7	0.538	3.7
	264	157	59.5	11.7	0.99	10.8	0.619	3.7
	225	128	56.9	12.3	1.00	12.3	0.597	3.8
	224	111	49.6	13.3	0.99	13.4	0.516	4.0
	329	172	52.3	11.5	0.85	13.5	0.465	3.8
	224	128	57.1	11.9	1.01	11.8	0.605	3.6
	280	160	57.1	11.9	0.90	13.2	0.542	3.7
	270	122	45.2	11.7	0.94	12.4	0.447	3.8
	262	142	54.2	12.0	0.84	14.3	0.477	3.9
Average	256	137	53.5	12.2	0.95	12.7	0.534	3.8
After 60 days Storage	215	108	50.2	11.5	0.90	12.8	0.477	3.7
	235	134	57.0	12.4	1.04	11.9	0.627	3.6
	183	100	54.6	12.4	0.80	15.5	0.459	3.7
	248	147	59.3	11.9	1.02	11.7	0.635	3.6
	239	138	57.7	12.3	1.03	11.9	0.623	3.7
	220	126	57.3	12.3	1.12	11.0	0.676	3.7
	219	107	48.9	12.9	1.04	12.4	0.533	3.7
	260	134	51.5	13.2	0.92	14.3	0.500	3.8
	222	130	58.6	11.9	0.97	12.3	0.598	3.7
	264	156	59.1	12.2	0.90	13.6	0.561	3.7
Average	231	128	55.4	12.3	0.98	12.7	0.569	3.7

ministration. It also seemed desirable to ascertain what effect, if any, this treatment might have on the chemical composition and vitamin C content of oranges.

CHEMICAL INVESTIGATION

For the first set of experiments, samples of heavily sprayed, medium sprayed, and unsprayed Florida Valencia oranges, both processed

TABLE II

CHEMICAL ANALYSIS OF NORMAL FRUIT, NOT SPRAYED, PROCESSED
LOT 2

	Weight of Orange	Volume of Juice	Per Cent Juice	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	Per Cent Acid in Fruit	pH Value
	gm.	c.c.	%	%	%		%	
As received	230	107	46.5	11.1	1.04	10.7	0.502	3.5
	263	136	51.7	11.6	0.92	12.6	0.496	3.7
	176	84	47.7	11.2	1.00	11.2	0.501	3.6
	205	105	51.2	11.7	1.08	10.8	0.584	3.6
	169	86	50.9	11.3	1.01	11.2	0.540	3.6
	238	133	55.9	11.1	1.03	10.8	0.598	3.7
	248	125	50.4	10.5	0.92	11.4	0.484	3.6
	226	128	56.6	10.2	0.89	11.5	0.526	3.6
	234	121	51.7	11.0	0.81	13.6	0.434	4.0
	276	123	44.6	10.6	0.86	12.3	0.526	3.8
Average	227	115	50.7	11.0	0.96	11.6	0.519	3.7
After 30 days Storage	234	105	44.9	11.2	0.59	19.0	0.278	4.0
	294	148	50.3	11.2	0.69	16.2	0.367	4.1
	296	156	52.7	11.1	0.95	11.7	0.522	3.7
	279	126	45.2	12.1	0.96	12.6	0.456	3.6
	332	178	53.6	10.1	0.60	16.8	0.332	4.0
	255	105	41.2	11.7	0.74	15.8	0.321	3.8
	242	133	55.0	11.4	0.78	14.6	0.451	3.9
	261	149	57.1	11.4	0.88	13.0	0.531	3.8
	241	121	50.2	11.9	0.86	13.8	0.457	3.8
	241	130	53.9	10.8	0.74	14.6	0.415	3.9
Average	268	135	50.4	11.3	0.78	14.8	0.413	3.9
After 60 days Storage	245	120	49.0	11.1	0.71	15.6	0.363	3.9
	239	124	51.9	11.9	0.75	15.9	0.410	3.9
	212	111	52.4	12.0	0.80	15.0	0.440	3.8
	255	126	49.4	11.4	0.76	15.0	0.395	3.8
	239	115	48.1	11.9	0.66	18.0	0.337	3.9
	239	129	54.0	11.5	0.66	17.4	0.378	4.0
	238	111	46.6	11.3	0.69	16.4	0.340	3.9
	228	123	53.9	11.8	0.86	13.7	0.485	3.8
	227	116	51.1	11.8	0.74	15.9	0.399	3.8
	204	97	47.5	11.2	0.66	17.0	0.328	3.9
Average	233	117	50.4	11.6	0.73	17.5	0.388	3.9

and unprocessed, were received from the Bureau of Plant Industry, Orlando, Fla. These were from the same orchard, and treatment had been similar except as above mentioned. The processing was carried out in accordance with the regulations of the Plant Quarantine and Control Administration and consisted of heating the fruit to 110° F. for a period of 8 hours in order to destroy larvae of the Mediterranean

TABLE III

CHEMICAL ANALYSIS OF MEDIUM SPRAYED FRUIT, NOT PROCESSED
LOT 3

	Weight of Orange	Volume of Juice	Per Cent Juice	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	Per Cent Acid in Fruit	pH Value
	gm.	c.c.	%	%	%		%	
As received	190	115	60.5	11.1	0.16	69.4	0.103	5.3
	193	111	57.5	12.3	0.32	38.4	0.196	4.7
	174	105	60.3	11.9	0.24	49.6	0.151	5.0
	187	107	57.2	11.9	0.28	42.5	0.166	4.6
	178	107	60.1	12.2	0.21	58.1	0.132	5.1
	192	115	59.9	10.5	0.19	55.3	0.120	5.2
	180	108	60.0	10.9	0.12	90.8	0.078	5.4
	171	107	62.6	11.0	0.17	64.7	0.113	5.2
	180	108	60.0	10.5	0.17	61.8	0.108	5.2
	177	106	59.9	10.8	0.42	25.7	0.264	4.8
Average	182	109	59.9	11.3	0.23	55.6	0.144	5.1
After 30 days Storage	171	85	49.7	11.6	0.22	52.7	0.114	5.0
	184	112	60.9	11.5	0.40	28.8	0.256	4.5
	208	123	59.1	11.0	0.22	50.0	0.136	5.0
	173	104	60.1	12.0	0.27	44.4	0.168	4.8
	173	105	60.7	11.2	0.28	40.0	0.176	4.7
	206	123	59.7	11.0	0.37	29.7	0.233	4.4
	191	116	60.7	10.4	0.52	20.2	0.328	4.1
	183	108	62.4	10.9	0.48	22.7	0.312	4.2
	178	105	59.0	11.0	0.19	57.9	0.118	5.0
	172	103	59.9	11.0	0.29	37.9	0.180	4.8
Average	184	108	59.2	11.2	0.32	38.4	0.202	4.7
After 60 days Storage	191	98	51.3	11.6	0.17	68.2	0.092	5.1
	151	84	55.6	11.9	0.18	66.1	0.106	5.0
	166	92	55.4	10.9	0.12	90.8	0.072	5.2
	171	94	55.0	11.5	0.17	67.6	0.099	5.0
	180	102	56.7	11.4	0.14	81.4	0.085	5.1
	154	92	59.7	11.7	0.10	117.0	0.066	5.4
	150	88	58.7	11.7	0.15	78.0	0.094	5.1
	145	85	58.6	11.6	0.15	77.3	0.094	5.1
	195	113	57.9	10.5	0.42	25.0	0.255	4.2
	125	83	66.4	12.0	0.16	75.0	0.113	5.0
Average	163	93	57.5	11.5	0.18	74.6	0.108	5.0

fruit fly. These samples upon receipt were placed in storage at 40° F. and examined at that time and 30 and 60 days later.

As individual oranges vary somewhat in acid and sugar content, 10 fruits of average size and apparent degree of ripeness were selected from each lot, individually weighed, halved, the juice extracted and measured, and then filtered through 2 thicknesses of cheesecloth.

Soluble solids were determined by specific gravity and converted to degrees Brix. Acidity was determined by titrating 10 c.c. of the juice of each orange with standard alkali and the results were expressed as per cent anhydrous citric acid. The pH was determined electrometrically by the quinhydrone electrode. A composite sample of equal amounts of juice from each fruit was used for the sugar determinations. Sugars were determined by reduction of Fehling's solution, before and after inversion,[7] the cuprous oxide being weighed, and the quantity of sugars present calculated with the aid of Munson and Walker's table and recorded as grams per 100 c.c.

The results of analyses made on the individual fruits are given in Tables I to VI. These show that there is a marked reduction in acidity of sprayed fruit. Heavily sprayed fruit has an acidity of about one-fifth of the normal, and medium sprayed about one-fourth. There is also a reduction in sucrose with a corresponding increase in invert sugar, the total sugar remaining the same. No changes due to processing were found on arrival of the shipment, nor did any develop on 60 days' storage.

One year later analyses were made on a second set of spray-treated fruit (Lots 7 to 10), Table VIII. All results given in this table were obtained from a composite sample made from the juice of 10 fruits. Lots 8, 9, and 10 were from the same orchard. Lot 7 was unsprayed fruit of the same variety but from a different orchard. Lot 8 had received approximately the same spray treatment as Lot 9 received the previous year, but no spray treatment during the current year of growth and ripening. This lot shows an almost complete recovery as indicated by the acidity and the Brix acidity ratio. The ratio of sucrose to total sugar given in the last column of this table shows the decline in sucrose according to the severity of the spray treatment. Lot 9 came from trees which had received a medium spray treatment in 1929 and in 1930, and Lot 10 was obtained from trees heavily sprayed both years. These lots show the same characteristics as Lots 3 and 5, respectively. There is a decrease in acidity with a corresponding increase in pH value and an increase in invert sugar at the expense of sucrose.

Samples of the juice and pulp from the heavily sprayed and unsprayed oranges were examined for arsenic by the Gutzeit method, but this was not present in more than the mere traces present in most food products.

Since there was a significant difference in the pH value, the effect of the juice from sprayed and unsprayed fruit was tried upon congo red paper. It was found that all the unsprayed fruit gave an acid re-

action against about 1 of 10 of the sprayed. The juices affecting congo red paper had an acidity of 0.4 per cent or greater, corresponding to a pH value of 4.4 or less. The reaction of the juice to congo red paper suggests a simple way of testing for reduced acidity in oranges due to spraying.

The total ash of sprayed and unsprayed fruit was 0.43 gm. per 100

TABLE IV

CHEMICAL ANALYSIS OF MEDIUM SPRAYED FRUIT, PROCESSED
LOT 4

	Weight of Orange	Volume of Juice	Per Cent Juice	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	Per Cent Acid in Fruit	pH Value
	gm.	c.c.	%	%	%		%	
As received	156	81	51.9	11.3	0.35	32.3	0.192	4.4
	170	100	58.8	11.3	0.16	70.6	1.100	5.0
	183	102	55.7	11.2	0.16	70.0	0.095	5.1
	178	95	53.4	11.0	0.32	34.4	0.176	4.6
	177	93	52.5	11.5	0.55	20.9	0.305	4.3
	169	93	55.0	11.2	0.21	53.3	0.121	4.9
	166	97	58.4	10.6	0.23	46.1	0.140	4.8
	150	89	59.3	11.7	0.35	33.4	0.219	4.5
	150	89	59.3	11.6	0.18	64.4	0.113	5.1
	162	89	54.9	10.7	0.23	46.5	0.132	4.8
Average	166	93	55.9	11.2	0.28	47.1	0.159	4.8
After 30 days Storage	155	82	52.9	11.7	0.16	73.1	0.090	5.3
	174	100	57.5	11.4	0.27	42.2	0.161	4.8
	185	103	55.7	10.4	0.16	65.0	0.095	5.2
	175	94	53.7	11.0	0.16	68.8	0.091	5.3
	180	101	56.1	10.9	0.27	40.4	0.157	4.8
	224	120	53.6	10.9	0.16	68.1	0.091	5.2
	192	114	59.4	12.0	0.56	21.4	0.350	4.1
	200	95	46.3	9.8	0.22	44.5	0.106	4.9
	231	136	58.9	10.9	0.17	64.1	0.106	5.1
	196	117	59.7	11.1	0.12	92.5	0.078	5.5
Average	191	106	55.4	11.0	0.23	58.0	0.133	5.0
After 60 days Storage	185	83	44.9	11.0	0.19	57.9	0.090	4.8
	154	75	48.7	10.2	0.17	60.0	0.088	5.0
	176	92	52.3	9.8	0.17	57.6	0.094	4.9
	166	86	51.8	10.4	0.20	52.0	0.109	4.8
	190	106	55.6	10.2	0.16	63.8	0.095	5.1
	159	89	56.0	11.4	0.16	71.3	0.095	5.0
	173	84	48.6	11.5	0.19	60.5	0.097	4.9
	199	107	53.8	10.0	0.15	66.7	0.086	5.2
	202	117	57.9	11.2	0.15	74.7	0.093	5.0
	186	96	51.6	11.9	0.22	54.1	0.119	4.9
Average	179	94	52.1	10.8	0.18	61.9	0.097	5.0

c.c. of juice in both. The alkalinity of the ash was the same in both—the ash from 100 c.c. of juice neutralized 44 c.c. of tenth-normal acid.

BIOLOGICAL INVESTIGATIONS

The marked effect of lead arsenate spraying upon the chemical composition of orange juice and consequent changes in the metabolism of the plant suggested the possibility of a change in vitamin C content. The feeding of orange juice to infants, particularly those artificially fed, is a well established practice, and it is therefore very desirable to know if any appreciable variation in the vitamin C content of oranges exists. Experiments were conducted on some of the fruit used in chemical analyses. Young guinea pigs, weighing with some exceptions from 275 to 300 gm., were kept in individual cages and fed a ration of rolled oats, 69 parts; alfalfa meal (autoclaved 1½ hours at 15 lb. pressure), 25 parts; commercial casein, 5 parts; sodium chloride, 1 part. The desired dose of orange juice was fed daily with a pipette. The animals were weighed twice a week and observations of their condition recorded at each weighing or oftener.

Three experiments were conducted, 2 in the winter of 1930, on different levels of the same orange juice and 1 in the winter of 1931. The first experiment was with 1 c.c. of orange juice per day from fruit that had not been sprayed (Lots 1 and 2), and from fruit of trees sprayed heavily with lead arsenate (Lots 5 and 6). Six animals were put into a control group and received no vitamin C. Twelve animals were fed the normal orange juice, and 12 the juice from sprayed trees. Two of the last died within a few days and are not considered in analyzing the results. The average weight changes of the animals in each group are shown in Figure 1, Groups 1, 2 and 3. From this it is apparent that the growth promoting effect of orange juice when it supplements a vitamin C deficient ration is greatly impaired by spraying with lead arsenate.

The animals in Group 1 lived an average of 18 days, ranging from 14 to 22. All of them showed symptoms of scurvy on the 12th day. All except 1 in Group 3 showed some symptoms of scurvy by the 15th day, 2 died, 1 in 20 days, and 1 in 26 days, after the experiment was begun. In Group 2, 4 animals developed scurvy by the 15th day, 1 in 19 days, 5 in 22, 1 in 26, and 1 in 28. There was, therefore, a marked delay in the onset of scurvy in the animals receiving the juice of fruit from unsprayed trees. Autopsy findings were confirmatory of the observations on the living animals. The experiment was discontinued at the end of 7 weeks. All of the animals showed extensive scorbutic lesions, but looseness of the teeth and brittleness of the bones

was considerably more pronounced in Group 3 than in Group 2.

The second experiment was begun 1 month after the first, using the same number of animals and the same orange juice, but 1½ c.c. of juice were fed daily. The growth response of these animals was distinctly better than with 1 c.c. of juice (Figure I) but growth on the normal juice was superior to that from the sprayed fruit. There was a greater difference with respect to onset of scurvy. The controls, Group 4, developed scurvy in 12 to 15 days and lived an average of 23 days. All the animals receiving the juice from sprayed trees (Group 6) showed some symptoms of scurvy by the 18th day and their condi-

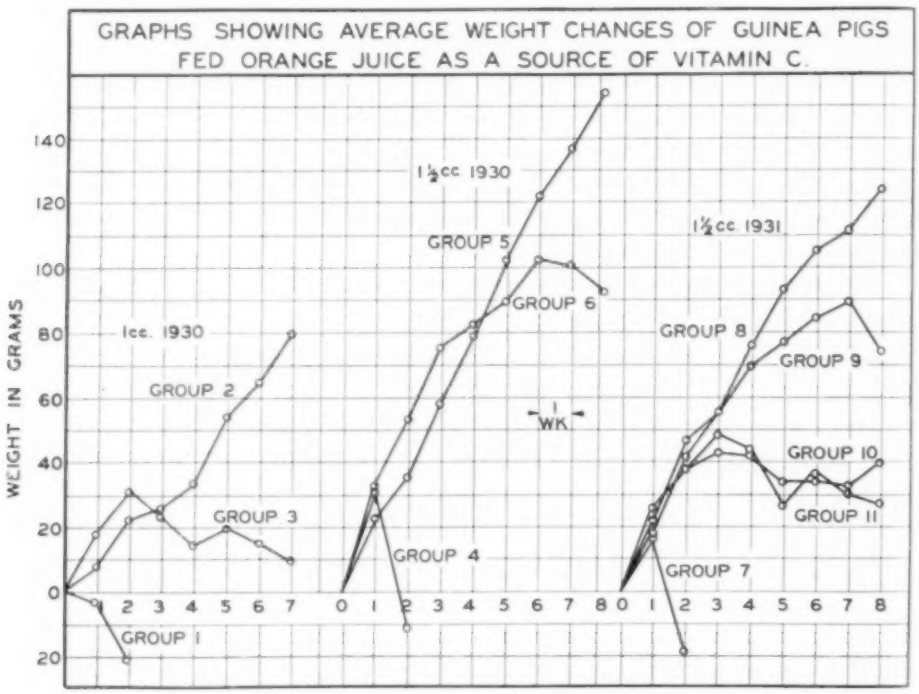

FIGURE I—These graphs show that when guinea pigs are fed orange juice as a sole source of vitamin C the growth response is greatly influenced by the quality of the juice as affected by spraying orange trees with lead arsenate. Group 1 received only the scorbutic ration. Groups 2 and 3 received 1 c.c. of orange juice daily from the fruit of unsprayed (oranges Lots 1 and 2) and heavily sprayed trees (oranges Lots 5 and 6), respectively. There were 6 animals in Group 1, 12 in Group 2, and 10 in Group 3. Groups 4, 5 and 6 are, respectively, duplicates of Groups 1, 2 and 3 with the orange juice fed at a 1½ c.c. level daily. There were 6 animals in the negative control, Group 4, and 12 in each of Groups 5 and 6. Eight animals were started in each of the remaining groups, but 1 animal in Group 8 and 2 in Group 11 died within a short time and are not included in the compilation of results. Group 7 received no vitamin C. Oranges from trees treated as follows were used in the remaining tests: Group 8, oranges Lot 7 not sprayed. Group 9, oranges Lot 8 medium-sprayed, 1929; no spray, 1930. Group 10, oranges Lot 9 medium-spray, 1929 and 1930. Group 11, oranges Lot 10 heavily sprayed, 1929 and 1930. There was no difference in growth of the animals, depending upon whether the trees had received heavy or medium spray treatment. Some effect of the spray treatment in 1929 was evident even though there was no spray during the year the fruit was grown.

tion remained about the same until the experiment was discontinued at the end of 8 weeks. Only 2 of the animals receiving normal juice (Group 5) developed scurvy, 1 in 17, and 1 in 28 days.

We were interested in any possible detrimental effect of processing mentioned and our investigations were planned to obtain information on this point. In the experiments just described 30 animals were di-

TABLE V

CHEMICAL ANALYSIS OF HEAVILY SPRAYED FRUIT, NOT PROCESSED
LOT 5

	Weight of Orange	Volume of Juice	Per Cent Juice	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	Per Cent Acid in Fruit	pH Value
	gm.	c.c.	%	%	%		%	
As received	264	137	51.9	9.6	0.24	40.0	0.130	4.9
	216	115	53.2	10.6	0.17	62.4	0.096	5.1
	225	125	55.6	10.3	0.12	85.8	0.072	5.4
	212	118	55.7	10.4	0.12	86.7	0.067	5.6
	220	126	57.3	11.2	0.14	80.0	0.086	5.6
	260	138	53.1	10.3	0.16	64.4	0.090	5.2
	192	100	52.1	11.5	0.14	82.1	0.078	5.3
	207	108	52.2	10.8	0.37	29.2	0.204	4.6
	204	109	53.4	9.8	0.18	54.4	0.101	5.1
	246	127	51.6	9.7	0.57	17.0	0.304	4.1
Average	225	120	53.6	10.4	0.22	60.2	0.123	5.1
After 30 days Storage	211	120	56.9	10.7	0.13	82.3	0.080	5.4
	217	122	56.2	10.7	0.23	46.5	0.135	5.3
	199	119	59.8	10.9	0.12	90.8	0.072	5.5
	235	136	57.9	11.0	0.12	91.7	0.069	5.6
	209	121	57.9	11.0	0.15	73.3	0.093	5.2
	219	129	60.8	11.2	0.10	112.0	0.067	5.7
	220	127	57.7	12.4	0.16	77.5	0.098	5.2
	199	116	58.3	11.7	0.14	83.6	0.087	5.3
	206	128	62.1	11.2	0.10	112.0	0.062	5.7
	202	112	55.4	11.9	0.22	54.1	0.127	5.0
Average	211	123	58.3	11.3	0.14	82.4	0.089	5.4
After 60 days Storage	190	98	51.6	11.9	0.47	25.3	0.253	4.3
	174	102	58.6	12.0	0.16	75.0	0.100	5.0
	198	108	54.5	12.4	0.12	103.0	0.071	5.4
	181	109	60.2	12.0	0.12	100.0	0.078	5.4
	182	113	62.1	11.7	0.10	117.0	0.062	5.6
	174	97	51.7	11.9	0.11	108.0	0.062	5.4
	158	90	57.0	12.4	0.11	113.0	0.080	5.5
	160	96	60.0	12.4	0.10	124.0	0.066	5.6
	157	92	58.6	12.4	0.14	88.6	0.088	5.4
	191	119	62.3	11.6	0.12	96.0	0.081	5.5
Average	177	102	57.7	12.1	0.16	94.9	0.094	5.3

TABLE VI

CHEMICAL ANALYSIS OF HEAVILY SPRAYED FRUIT, PROCESSED
LOT 6

	Weight of Orange	Volume of Juice	Per Cent Juice	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	Per Cent Acid in Fruit	pH Value
	gm.	c.c.	%	%	%		%	
As received	196	105	53.6	10.1	0.15	67.3	0.086	5.3
	227	135	59.5	10.4	0.12	86.7	0.071	5.7
	173	107	61.8	11.0	0.11	100.0	0.068	5.7
	194	118	60.8	11.5	0.13	88.5	0.085	5.7
	151	92	60.9	12.2	0.14	87.1	0.091	5.4
	196	122	62.2	11.7	0.19	61.2	0.124	5.1
	171	94	55.0	11.6	0.12	96.7	0.072	5.6
	137	89	65.0	11.6	0.10	116.0	0.072	6.2
	156	96	61.5	12.0	0.10	120.0	0.062	6.0
	196	113	57.7	11.2	0.14	80.0	0.087	5.5
Average	180	107	59.8	11.3	0.13	90.3	0.082	5.6
After 30 days Storage	225	116	51.6	11.0	0.18	61.1	0.098	5.3
	207	128	61.8	11.0	0.13	84.6	0.087	5.4
	230	129	56.1	10.4	0.14	74.3	0.084	5.2
	243	146	60.1	10.9	0.19	57.4	0.120	5.1
	266	154	57.9	10.2	0.16	63.8	0.098	5.2
	247	133	53.8	10.4	0.27	38.5	0.151	4.8
	201	119	59.2	11.0	0.24	45.8	0.148	5.0
	224	126	56.3	11.0	0.48	22.9	0.282	4.4
	218	128	58.7	11.0	0.55	20.0	0.335	4.2
	220	130	59.1	10.7	0.18	59.4	0.112	5.1
Average	228	131	57.5	10.8	0.25	52.8	0.152	5.0
After 60 days Storage	216	116	53.7	9.0	0.11	81.8	0.059	5.5
	150	81	54.0	11.8	0.14	84.3	0.081	5.2
	179	108	60.3	11.0	0.11	100.0	0.066	5.5
	175	100	57.1	11.0	0.17	64.7	0.103	5.0
	186	107	57.5	10.2	0.16	63.8	0.098	5.1
	166	100	60.2	10.5	0.16	65.6	0.102	5.2
	155	93	60.0	11.8	0.10	118.0	0.066	5.5
	158	88	55.7	11.6	0.10	116.0	0.061	5.7
	181	99	54.7	11.4	0.11	104.0	0.066	5.5
	166	103	62.0	11.4	0.13	87.7	0.087	5.4
Average	173	100	57.5	11.0	0.13	88.6	0.079	5.4

vided into 5 equal groups. Group 1 received no vitamin C, while the others received orange juice as follows: Group 2, normal oranges, unprocessed; Group 3, normal oranges, processed; Group 4, oranges from heavily sprayed trees, unprocessed; Group 5, oranges from heavily sprayed trees, processed. Processing had no demonstrable effect on vitamin content of oranges irrespective of whether the trees were

sprayed or not. For the purpose of discussing the effects of spraying, the animals have been regrouped without reference to whether the fruit was or was not processed.

The third experiment, carried out in 1931, was designed to obtain more accurate information on the effect of different degrees of spraying on vitamin content of the fruit. Forty animals were divided into 5 equal groups. Group 7 received no vitamin C, and Group 8 received normal orange juice; the remaining received orange juice from trees which had the following treatment: Group 9, no spray in 1930 and medium spray in 1929; Group 10, medium spray in 1929 and 1930; Group 11, heavy spray in 1929 and 1930. The growth of the animals (Figure I) is in fairly good agreement with the chemical findings. The effect of spraying in 1929 is evident though there was no spraying

TABLE VII

SUGAR DETERMINATIONS
LOTS 1 TO 6

	Sucrose	Invert Sugar	Ratio $\frac{\text{Sucrose}}{\text{Total Sugar}}$	Acidity as Anhydrous Citric Acid	pH Value
Lot 1					
As received	5.24	4.26	0.552	0.94	3.6
After 30 days	5.66	4.68	0.547	0.95	3.8
After 60 days	5.51	4.78	0.535	0.98	3.7
Lot 2					
As received	5.20	4.45	0.539	0.96	3.7
After 30 days	5.54	3.97	0.583	0.78	3.9
After 60 days	5.70	4.05	0.585	0.73	3.9
Lot 3					
As received	4.99	4.74	0.513	0.23	5.1
After 30 days	4.26	5.71	0.427	0.32	4.7
After 60 days	3.55	6.84	0.342	0.18	5.0
Lot 4					
As received	5.13	5.04	0.504	0.28	4.8
After 30 days	4.16	5.68	0.423	0.23	5.0
After 60 days	4.05	5.25	0.425	0.18	5.0
Lot 5					
As received	4.04	5.03	0.445	0.22	5.1
After 30 days	3.53	6.56	0.350	0.14	5.4
After 60 days	3.08	7.42	0.293	0.16	5.3
Lot 6					
As received	3.75	6.05	0.383	0.13	5.6
After 30 days	4.53	4.99	0.476	0.25	5.0
After 60 days	3.41	6.36	0.349	0.13	5.4

TABLE VIII

CHEMICAL ANALYSES OF ORANGES
LOTS 7 TO 10

	Soluble Solids (Brix)	Acidity as Anhydrous Citric Acid	Ratio Brix / Acidity	pH Value	Sucrose gm. per 100 c.c.	Invert Sugar gm. per 100 c.c.	Ratio Sucrose / Total Sugar
	%	%					
Lot 7 Normal fruit, unsprayed	11.9	1.02	11.7	3.6	5.03	4.84	0.520
Lot 8 Medium spray, 1929; No spray, 1930	13.3	0.89	14.9	3.8	6.06	5.87	0.508
Lot 9 Medium spray, 1929 and 1930	13.2	0.55	24.0	4.3	5.70	6.40	0.471
Lot 10 Heavy spray, 1929 and 1930	12.4	0.26	47.7	4.9	4.46	6.90	0.393

the year the fruit matured. There was no demonstrable difference between the fruit from medium and heavily sprayed trees. The negative control group developed scurvy in an average of 14 days and survived an average of 22 days. No scurvy was observed in Groups 8 and 9 and only slight evidence of it was revealed by autopsy. There were 2 cases of marked scurvy in Lot 11, 1 in 28 and 1 in 42 days. There were 4 deaths in Group 10 after the 5th week. All of the animals in Groups 10 and 11 showed extensive lesions of scurvy upon autopsy.

DISCUSSION

The ratio, Brix to acidity, is used in determining the degree of maturity of citrus fruits intended for interstate shipment. By means of the Brix spindle the total soluble solids of the juice are determined. Acidity is calculated as anhydrous citric acid from the titrable acidity. The Brix acidity ratio is obtained by dividing the percentage of total soluble solids by the percentage of citric acid. The value of this ratio increases as the ripening of the fruit progresses. The minimum values set by maturity standards based on this ratio are reached earlier by the use of arsenical sprays. This fact has been taken advantage of

by unscrupulous fruit growers to market their fruit early in the season when better prices may be obtained.

It seems desirable to make it clear that there is little danger of consumption of arsenic when eating fruit from sprayed trees. Furthermore, citrus fruits normally receive a cleansing treatment before being placed on the market. While this might not remove all the residue in the pores of the peel, the remainder would be discarded with the peel or in extracting the juice. There is no detectable increase in arsenic in the juice or pulp of oranges from sprayed trees over that found in those from unsprayed trees.

The changes in chemical composition of oranges due to spraying assume greater significance in the light of the low vitamin content of such fruit since the chemical changes involved may be much more extensive than those recorded to date. The changes known to take place in citric acid and in sugar content do not alter appreciably the nutritive value of the fruit. However, oranges are a very important source of vitamin C and the decrease in this factor is worthy of serious consideration. Fortunately, both California and Florida have laws preventing the use of arsenical sprays on citrus fruits. These laws were designed to protect the citrus fruit industry by preventing the sale of immature fruit that meet the standard necessary for interstate shipment. Our findings on the lessened nutritive value of sprayed oranges now add an important additional reason for the enforcement of these laws.

These investigations indicate that the Brix acidity ratio can be used to indicate low vitamin C content of orange juice. Further study should be made to determine to what extent the high Brix acidity ratio can be correlated with low vitamin C content. We conclude from the experiments that have been completed that the vitamin C content of heavily sprayed oranges is decreased fully one-third and it may be only one-half of that of unsprayed fruit.

Owing to the widespread use of arsenical sprays to combat insect pests, the observation that lead arsenate adversely affects the vitamin C content of oranges opens up a new field of investigations. Additional studies involving the effects of various sprays upon the vitamin content of fruits and vegetables are being planned.

SUMMARY

Data are presented to show that oranges produced by trees sprayed with lead arsenate differ in chemical composition from normal oranges. The most pronounced difference is a reduction in acidity of the juice; there is also a decrease in sucrose with a corresponding increase in invert sugar.

The arsenic content of the edible portion of the orange was not changed by spraying the tree with heavy doses of lead arsenate.

The vitamin C content of oranges from trees sprayed with lead arsenate was found to be considerably lower than that of oranges from unsprayed trees of the same variety and the same degree of maturity.

The processing of oranges as practised by Plant Quarantine and Control Administration to destroy larvae of the Mediterranean fruit fly did not change the character of the sugars, citric acid or vitamin C content of the fruit.

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Washington Cathedral, located on Mount Saint Alban, at an elevation of 400 feet above the Potomac River

Public Health Aspects of Frozen Foods*

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THE phenomenal growth of the frozen food industry in the United States and the British Empire during the past few years may well cause public health officials to inquire into its public health aspects. Statistics for 1930 show a production in the United States of 320,000,000 gal. of ice cream, 77,000,000 lb. of poultry, 30,000,000 lb. of strawberries, 100,000,000 lb. of fish, and correspondingly huge quantities of meats, fruits, and other products. That the industry will grow in the future is certain. At present we are in a stage of flux and experimentation. New products are being frozen, new and improved equipment and processes are being developed, and the thermodynamics and mechanical phases of freezing are becoming better understood.

Freezing as a means of preserving perishable food is not new. The Greeks and Romans were thoroughly acquainted with the preserving action of cold. As long ago as 1860 in Australia, Morris and Mort[1] are said to have been the first to freeze successfully and export beef and mutton to England. Piper[2] in Maine was the pioneer in commercial fish freezing in 1861. Similarly, frozen eggs and poultry have been staple commodities since before 1900. The addition of fruits, filleted fish, meat cuts, and vegetables to the list of frozen foods is much more recent. Though packed experimentally in 1912, fruits were first frozen commercially in the Pacific Northwest about 1918.[3] The production of all varieties of frozen berries, peaches and cherries has reached tremendous totals comprising a considerable percentage of the crop. It cannot be said even now that frozen vegetables are commercially successful. The successful launching of new foods depends upon research, advertising, and the repeat orders of the consumer.

The food habits of a nation cannot be changed overnight. Frozen foods must compete with fresh grown, shipped-in, canned, dried, salted, and smoked products. The capacity of the human stomach does not change. When we eat frozen fish, we buy less fresh fish. In time the

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public will learn which foods are best canned, which are best frozen or otherwise preserved. It is almost axiomatic that no preserved foods will wholly substitute for the fresh, though for the sake of convenience, dietary variety, and nutritional balance, they will always find a ready market. It is certain that the public will prefer frozen perishable foods of good quality if the cost is reasonable, to low quality or unattractive fresh foods.

The economic advantages of frozen foods should be briefly mentioned. Especially such perishable ones as fish, meats, and fruits are prepared at central points where available. Waste and inedible parts are removed. Transportation charges are less and the foods do not deteriorate greatly in storage. Freezing utilizes perishable crops, stabilizes industry, prevents waste, and facilitates marketing. Frozen foods are convenient to handle, require little space and make an attractive display. The shopkeeper likes them because he can readily figure his profit as in other packaged goods. Optimists in the industry predict that the time is not far distant when a large percentage of the 400,000 grocery stores in the country will handle packaged foods.

GENERAL HEALTH ASPECTS

In what ways can this huge new industry affect the public health? The following factors seem to have some bearing on the question.

1. Sanitation and working conditions at the freezing plants
2. Freshness and soundness of raw materials
3. Effectiveness of the process, its controllability and dependability
4. Effect of freezing and storage on quality, chemical, and nutritive values
5. How does freezing and storage affect bacterial population of the food?
6. What happens when frozen foods are thawed and how long after defrosting do they remain safe to eat?

SANITATION AND WORKING CONDITIONS

The writer has had the opportunity of inspecting a considerable number of freezers for the handling of meats, fish, poultry, fruit, in plants located in the East, West, and South. With very few exceptions, there are only minor sanitary problems. Since nearly all freezers are located in cities, modern plumbing and sewage disposal systems are available. In general, fish, meats, and poultry are prepared for freezing in clean surroundings.

Birdseye,[3] and Tressler,[4] have described the really excellent sanitary measures which have been adopted by some of the largest plants. Their investigations showed a progressive reduction in bacterial numbers as the fish were washed, skinned, filleted, and packaged for freezing. Titman[5] also described the effective sanitary measures in use in

modern egg freezing plants. Ample clean water is usually at hand, while fairly good lighting and ventilation systems are the rule.

The use of chlorine and hypochlorite in the washing waters and brines in some plants is a highly commendable practice. Because of the fact that foods to be frozen are often kept many months before being sold and consumed, the quality of the raw material is carefully watched. It is thoroughly understood by the trade that poor quality, or semi-spoiled fish, poultry, fruit or eggs cannot be improved by freezing. In fact, operators recognize that the quality of such foods is very likely to become poorer during freezing storage and sometimes they become tainted and unfit for human consumption when thawed out. The activity of the federal and state food officials in carefully inspecting frozen foods, both at the time of packing and while in storage, also acts as a strong deterrent against the use of poor quality raw products.

Working conditions in the plants compare favorably with those in other industrial establishments such as canneries. Limited data collected at several cold storage or freezing plants do not show any greater incidence of respiratory disease among workers than is normal for the community. I believe we can truthfully state that plant sanitary standards are relatively high. One reason for this is that many owners and operators of freezers are unusually progressive, intelligent, and public minded.

RAW MATERIALS

The absolute necessity of using only first quality raw products for freezing is fully recognized. Formerly, unscrupulous dealers sometimes resorted to freezing poultry, fish, or meat which was in an incipient stage of decomposition, but repeated losses, frequent seizures by the state and federal officials, and a general lack of interest in such foods by the trade, have caused this shady practice to be abandoned.

To more than any other single factor, the general lack of public faith in frozen foods has been due to their uncertain quality. It has been a hard fight to persuade the people that frozen meats, fish, eggs, poultry, fruits, and vegetables can be nearly as attractive and fully as sound, palatable, and nutritious as when fresh. In justice to modern progressive operators, much praise must be given them for the extreme care they are now taking to guard the high grade and soundness of their packs.

In the freezing of foods there is no excuse for delay, which brings on deteriorative changes. Berries must be free from mold, fermentation, and dirt. Fish and other marine products must be thoroughly cleaned, uncontaminated with fecal bacteria, and free from odor or

even incipient spoilage. Meats must be subjected to the usual federal inspection for evidence of disease or other conditions which might render them unfit for human consumption.

Some municipalities require inspection of poultry as well as meats. Some years ago in the Pacific Northwest it was customary to freeze lower grades and soft berries that could not be marketed fresh or sold to the canneries. Is it any wonder that frozen pack fruit bore a poor reputation? It can now be said that at least average quality raw products are used for the modern frozen pack of all foods.

EFFECTIVENESS AND DEPENDABILITY OF FREEZING

It is outside the province of this paper to discuss the relative merits of various freezing systems or methods. Several commercial processes now in use are strictly dependable and effective. We hear a great deal about "quick-freezing." This catchword has been over-emphasized. To the layman it means some special new method, by which the food is frozen in a few seconds or minutes at most. The truth is that many successful methods are being used to freeze foods with reasonable rapidity, but even the so-called "quick-frozen" foods, in very small packages or cartons, require an hour or more. No satisfactory methods of freezing large quantities or pieces, such as carcasses of beef, have been devised.

There is a growing tendency to freeze at lower temperatures than formerly. The usual range for rapid freezing is from 0 to 40° below zero F. Since most foods contain from 70 to 95 per cent of water, they begin to freeze at about 32 to 25° F. In lowering the temperature from 32° to 15° F., about 85 per cent of the water of a food crystallizes as ice; at 0° F. approximately 95 per cent of the water is frozen. When water separates as ice there is a gradual increase in concentration of the remaining liquid. This renders freezing increasingly difficult as the amount of free moisture diminishes. Complete freezing of the water takes place at temperatures of 60 to 100° below zero F. in most foods.

Slow freezing in air produces slow growing, large ice crystals in the intercellular spaces. Sharp or rapid freezing of flesh foods produces crystals only in the muscle fibers themselves and not in the intercellular spaces. Such foods thus retain their former appearance upon thawing.

Planck, Ehrenbaum and Reuter[8] in 1916, conducted some of the first experimental work on the effect of freezing on foods, especially fish. They conclusively demonstrated the greater efficacy and desirability of rapid freezing at low temperatures in so far as the physical, histological, and chemical character of the frozen or thawed product

was concerned, and showed the necessity of a controlled, even, low storage temperature in order to avoid deteriorative changes. A good summary of the changes occurring during freezing and thawing is given by Glennie[7] and Planck.[8]

It is untrue that large ice crystals formed in slow freezing are the main cause of the exudation or "drip" of juice in frozen flesh foods. Though laceration of the cells may occur, this is not the primary cause of leakage, notwithstanding popular opinion to the contrary. Leakage or drip in frozen foods causes the loss of valuable extractives and salts, and should be eliminated if possible. The cause is a more or less irreversible flocculation or coagulation of colloidal gels of which cells and protoplasm consist. Modern methods of rapid freezing have been developed which largely prevent leakage in meat and fish upon thawing. Leakage in plant products, however, cannot be overcome because of fundamental differences in the composition and gel structure of the plant cell.

The cell contents of both plants and animals consist of a colloidal gel containing proteins, salts and water. When the water is frozen the gel structure or network is broken down. In the case of flesh, the colloidal gel structure is largely reversible and when frozen meats or fish are thawed, the cells reabsorb most of the water. That is, flesh foods retain their structure and texture better than plants. The cell walls of flesh are highly elastic; those of plants are composed of cellulose and pectins and are inelastic. In fruits and vegetables the gel being irreversible, cell walls rupture, water is not reabsorbed after thawing, and the fruit or vegetable loses its turgidity and original firm structure. For full discussions of the physical effects of freezing tissue see Taylor,[9] Birdseye,[10] Woodruff,[11] Magoon,[12] and Joslyn.[13] The addition of sugar to fruits greatly aids in preserving the original characteristic flavor and color. Diehl,[2, 14] Fellers and Mack,[15] Joslyn and Cruess,[16] and Woodroof[17] have investigated the freezing of fruits with and without sugar for use in ice cream, jams, juices, and for table consumption. While fruits were originally frozen exclusively in 50 gallon barrels, the use of smaller containers suitable for the retail trade, such as hermetically sealed and slip-on covered tin cans, glass jars, waxed paper cups, and cartons, and cellophane packages for a wide variety of products is increasing.[16, 17, 18, 19, 20]

It has been proved that frozen foods dry out considerably and lose weight during storage.[20] There is also a tendency for fats to oxidize and become rancid and for "rusting" to occur. This "rusting" has been shown by Taylor[21] to result from a change of hemoglobin to methemoglobin. Enzymic oxidations sometimes produce surface dis-

colorations, the degree being largely dependent upon the amount of oxygen present. So far as is known the enzymes are merely inactivated by freezing. These difficulties have led to studies of wrapping and packaging methods, whereby oxidative and other deteriorative changes are kept at a minimum. While it is true that rapidly frozen foods contain relatively small crystals immediately after freezing, it is not generally known that these grow during storage. This is particularly noticeable in brined products. Fluctuations in temperature are especially serious in this respect and may cause considerable loss in quality. The temperature must therefore be under delicate control and maintained at about 10° F. or lower.

Transportation is another problem not yet fully worked out. Balsa wood, or thick waxed corrugated fiber board cartons, lined with moisture proof paper and heat sealed, serve as excellent insulators and are extensively used for shipping products which do not contain much free juice. Such containers will keep the contents in good condition for 3 to 4 days. Refrigerated cars are used for long distance shipments. Carbon dioxide ice has been used during transit and is very effective. It is also used to keep retail purchases of frozen food in good condition for several hours. Greater care is necessary with frozen plant products than with flesh foods because enzymic action, breakdown and leakage begin at lower temperatures in the former. In any case the consuming public should have assurance that the freezing, storage, and transportation are effective and under control, and that frozen foods offered for sale have not been previously thawed.

EFFECT ON NUTRITIVE VALUES

Freezing *per se* has little effect on the nutritive properties of foods. The relation of leakage or "drip" to physical changes has already been discussed.

Richardson and Scherubel,[23] in 1908, were among the first to find that very little chemical change occurs in frozen meats. Their findings have been amply verified by C. S. Smith,[28] Clark, Almy and Pennington,[24] and Almy and Field.[25] Taylor[9] and Birdseye[10, 20] studied the effects of freezing on animal and plant tissues and concluded that the only significant changes which occur are histological and physical, and these can be largely eliminated by the use of suitable processes and equipment.

The investigations of Birdseye,[10, 20] Taylor,[9] Woodroof,[11] British Food Investigation Board,[26] The Council for Scientific and Industrial Research in Australia,[27] Joslyn,[17] Classen,[28] Low Temperature Experiment Station, Cambridge, England,[29] Diehl and others[2, 14] have proved

the feasibility of freezing a wide range of foods with retention of good quality, flavor and eye-appeal. The conditions of packing, suitability of varieties or species, proper storage temperatures, and effect of thawing have been studied. If the juices of frozen foods are retained and eaten, there would appear to be no loss in valuable extractives. The darkening and oxidative changes which occasionally occur are of importance principally because they affect appearance and palatability. Very little research has been conducted on the nutritive value of frozen foods. Vitamins A, B, and D are uninjured by freezing.[20, 21] The fate of vitamin C after thawing is more uncertain, especially when stored for long periods of time. Delf[21] working with orange juice, and Bracewell, West and Zilva[22] with apples, found little loss resulted from freezing storage. Our own studies[24] on cranberries indicate a considerable loss when held in air at 10° F. for a year. Much research is needed on the effect of freezing and storage on the vitamins. It seems likely that some losses in vitamin C would occur, should defrosted fruits and juices stand for any considerable time.

EFFECT ON MICROÖRGANISMS

Very little information is available on the number and character of the microörganisms in frozen foods. The writer recently made some determinations, shown in Table I. Except in the case of fish and beef, which were brine frozen at 10° F., the other foods were frozen in air at —10° F. in sealed tin cans. Examinations were made after approximately 12 months in freezing storage at 10° F. Good quality fresh products were used for these experiments. The original bacterial count was not taken.

Presumptive tests for *B. coli* made for each sample were all negative. Corn, peas, and beans yielded cultures resembling *B. aerogenes* and *B. cloacae*. Many pinpoint colonies were present on the plates made from the peas and corn after thawing. The varieties of bacteria were relatively few. Though not carefully counted, molds were fully as numerous as bacteria in the fruits, but the standard methods agar is not a particularly favorable medium for molds. Yeasts were present in moderate numbers. Irish and Joslyn[24] have demonstrated the resistance of yeasts to freezing storage. Fruits packed with sugar had fewest organisms of all. Upon thawing, the greatest increase occurred in the fruit frozen without sugar. Except for a little surface discoloration, the sugar packs were in good condition after 36 hours, while fermentation and surface molding were observed in all samples not containing sugar.

Though the initial bacterial population of the frozen vegetables and

TABLE I

MICROÖRGANISMS IN FROZEN FRUITS, VEGETABLES AND OYSTERS, AND IN THE SAME FOODS AFTER STORAGE FOR 24 HOURS AT 70° F.

Product	Bacteria per gram Frozen	Anaerobes in 10 grams	Bacteria per gram after storage 24 hrs. at 70° F.	Anaerobes after 24 hrs.	Odor
Raspberries—with sugar 3 : 1	3,000	−	8,000	+	good
Raspberries—cardboard box	270,000	+	3,600,000	+	"
Raspberries—cardboard box	8,000	−	850,000	−	"
Strawberries—cardboard box	10,000	−	27,000	−	"
Strawberries—cardboard box	8,000	−	160,000	−	"
Strawberries—with sugar 2 : 1	200	−	2,000	−	"
Peaches—sliced, cardboard box	50	−	600	−	"
Peaches—sliced, with sugar 3 : 1	60	−	700	−	"
Cherries, sour pitted with sugar 3 : 1	0	−	20	−	"
Peas—blanched	8,000	+	29,000,000	+	sour
Peas—blanched	less than 1,000	−	24,000,000	+	"
Green beans blanched	less than 1,000	+	40,000,000	+	abnormal
Green beans blanched	2,000	−	30,000,000	+	sour
Sweet corn blanched	5,000	+	100,000,000	+	putrid
Sweet corn blanched	1,500	+	60,000,000	+	putrid
Carrots blanched	3,000	+	5,800,000	+	abnormal (no gas)
Carrots	less than 1,000	−	3,600,000	−	abnormal
Oysters	22,000	+	320,000,000	?	sour

oysters was small, a tremendous increase occurred within a very few hours after thawing. There was a loss of characteristic odor in about 6 hours, followed by souring and finally decomposition. Cocci, sporulating aerobes and a varied flora were present. The thawed vegetables and their juices make an excellent culture medium for bacteria, and unless held at very low temperatures soon spoil and become unfit for food. This is an important point which should be emphasized.

Frozen foods must be plainly labelled "Perishable," especially if sold in tin containers, so that the public will not treat them in the same way as the well known heat-canned foods. For this reason, it has been suggested that sealed tin cans be not used for frozen foods,[12] but they have so many advantages that this is scarcely feasible. Aside from its convenience, air-tightness, and ability largely to eliminate oxidation and flavor losses, the sealed can swells or bulges when the contents spoil. As in heat-canned foods, this swelling will serve notice on the housewife that the contents are not safe to eat.

Under the anaerobic conditions existing in the sealed can, spores such as *Cl. botulinum*, if present, may readily develop and form toxin, particularly after thawing has begun. It is not believed that appreciable bacterial growth would occur in the very short time required to

freeze small packages; besides some oxygen is still present in evacuated cans for several days after sealing. The oxygen present in the tissues and in the interspaces of foods gradually combines with the metals of the can. Paper or cardboard cups and boxes are not airtight; hence danger from toxicogenic anaerobes probably is not present in foods frozen in this type of container.

Poultry is usually frozen whole. Fish may be frozen in the round, dressed, or boned and filleted. The latter method has found decided favor with the housekeeper. Meats are also being extensively retailed in wrapped, attractive packages. Though extensively consumed for a great many years, no serious outbreaks of disease or illness have been proved to be caused by frozen meats, fish, or poultry. They are packed in small paper boxes and often wrapped with cellophane. So long as the packages are kept frozen no difficulty need be anticipated, but upon thawing, leakage and decomposition may occur.

A few data (Table II) were obtained on the bacterial content of frozen fish, poultry, and beef, (1) after having been frozen a year, and (2) after thawing for 24 hrs. at 70° F. The products were wrapped in waxed paper and packed in small paper boxes holding about 1 lb. Freezing was carried out at —10° F., and storage at 10° F.

TABLE II

BACTERIA IN FROZEN MEAT, POULTRY AND FISH AND IN THE SAME FOODS AFTER STORAGE AT 70° F. FOR 24 HOURS

Product	Bacteria per gram Frozen	Anaerobes per 10 grams Frozen	Bacteria per gram after 24 hrs. at 70° F.	Anaerobes Thawed 24 hrs.	Odor
Beef Steak	390	—	1,400,000	—	sl. abnormal
Pork Chops	1,300	—	8,700,000	+	sl. sour
Haddock	38,000	—	770,000	—	normal except slight NH_3 odor
Salmon *	20,000	—	330,000	—	lack of fresh odor
Whole chicken (breast)	0	—	30	—	fresh
Eggs (in tin can)	190,000	+	70,000,000	+	sour, tainted odor

* The salmon had been previously frozen.

After defrosting for 24 hours, the eggs were of poor quality bacteriologically; the meats, fish, and chicken were excellent. They also kept better following exposure to high temperatures than fruits or vegetables. The bacteria present in the meats, haddock, and salmon were mainly Gram-positive cocci, fluorescens types, achromobacter and flavobacter of several types. The flora was entirely different from that found on vegetables. The absence of anaerobes is notable. All

presumptive tests for *B. coli* were negative, though closely allied species were present.

These data indicate that if good quality raw products are used freezing will preserve the food perfectly for a long time.

That the original bacterial content of fresh fish and probably of other foods is greatly reduced by freezing, has been shown by Birdseye,[4] Pease,[25] and Green.[26] Aside from the few results published by Birdseye,[4] no report was found bearing on the multiplication of microorganisms in frozen foods after thawing. Researches should be conducted on this important point. It is important that we know how long the various frozen foods can be kept at various temperatures before becoming unsafe or unfit to eat.

SUMMARY

Frozen food factories are clean and modern methods of sanitation are used in preparing the many perishables now packed. The quality of the raw product is high and if the freezing is prompt and rapid, and the storage kept at low, constant temperatures, little or no deterioration in quality, appearance or nutritive value occurs. Several types of very efficient mechanical equipment are available to carry out the freezing process.

Fish, meats, poultry, eggs, and oysters are especially well preserved by freezing because they retain more nearly their fresh appearance, flavor, and character than fruits or vegetables. Most fruits are best when frozen with sugar and in this form retain their flavor very well. Vegetables are the most recent addition to the list of frozen foods. Though some varieties freeze very well, others do not. Both fruits and vegetables bleed freely on thawing. Spoilage occurs very quickly in vegetables after defrosting. More research is urgently required on the microbiology of frozen flesh foods and vegetables.

Little change occurs in the chemical, enzymic, or nutritive properties as a result of freezing. The changes are largely physical. Freezing greatly reduces the number of microörganisms present in foods, and prevents their multiplication. Emphasis must be placed on the prompt utilization of frozen foods. Until more is known about the subject, frozen products should be consumed while still frozen or within a very few hours after defrosting.

The ready availability of a large variety of frozen foods at all seasons will serve to give variety and balance to the human diet and should aid in decreasing nutritional deficiency diseases. The future of the industry is bright.

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Air Ambulances in Siam

A NOVEL feature of the health work in Siam is the air-ambulance service. Owing to lack of highways, the usual means of transport is the bullock cart. As this method is too slow for patients requiring urgent medical treatment, the government has arranged that the regular mail-service airplanes shall also carry sick persons, physicians, and medical supplies. Persons unable to pay are carried free of charge; for others there is a fixed mileage rate. Medical supplies for combating epidemics are transported free.

Siam now has nine Red Cross health centers, three of which are in Bankok, where the first center was opened in 1923, according to the London *Mother and Child*. This Far-Eastern country, whose progressive absolute ruler recently visited the United States, also has a school, opened in 1925, which offers a 6-month course in public health nursing and midwifery to graduate nurses.—U. S. Children's Bureau, Washington, D. C.

A Statistical Study in Maternal Mortality*

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IT is a truism that the underlying object in compiling vital statistics should be as an aid in the protection and permanency of the community. They are not compiled merely to satisfy idle curiosity or to bolster some pet theory. Vital statistics, like all statistics, are not worth the time and money spent on them if the usefulness of the facts disclosed does not serve the State.

In the preparation of the material for the present paper a somewhat new line of approach to the important subject of maternal mortality was followed, namely, to treat it from a more or less purely statistical viewpoint. In looking over the reports of Annual Meetings of this Association within the last few years we find nearly a score of papers dealing with various phases of this subject, but nearly all were given before the Child Hygiene Section and we have no quarrel with the manner or place of presentation. It may further be remarked that in no instance did these papers deal with the purely statistical aspects of the subject.

In an endeavor to approach the subject from an angle which had not been so thoroughly explored it was thought that interesting and illuminating statistical results might be got by relating the maternal death certificates with the birth certificates corresponding to the event which terminated fatally for the mother, and when the record was dubious or insufficient by making supplementary inquiries to ascertain whether a birth had taken place. The reason that a reference had to be made to the birth certificates was that the mortality certificate did not show whether the death was associated with a birth or not. Therefore not having the necessary information to classify the death according to the kind of birth on the mortality certificate it became necessary to consult the birth certificate to ascertain whether the maternal death was associated with a live birth, a stillbirth or no birth. This investigation yielded some interesting discoveries, not the least of which was that of 70 deaths credited to "abortion," 13 of them were found to have been associated with a live birth and 7 with a stillbirth. The ex-

* Read before the Vital Statistics Section of the American Public Health Association at the Sixtieth Annual Meeting at Montreal, Canada, September 17, 1931.

planation of these apparently contradictory assignments may be found in the too wide use of the term "abortion" as a cause of death by the physicians certifying. In each case the medical certificate gave the cause of death as "abortion," while our later search for the special purposes of this paper revealed the existence of a certificate for a live birth or a stillbirth.

Although the task promised to be tedious, yet, because of the interest presently evinced in maternal mortality and its associated phenomenons, it appeared well worth the trouble to link wherever possible the maternal death with the birth certificate referring to the same event. The investigation was started first with the certificates for 1926, but the figures for that year being less detailed and less carefully investigated have not been used in this paper. For 1927 and 1928 the investigation was conducted in as thoroughgoing a fashion as the data available and the circumstances would permit, and it is with the results for these two years combined that this study deals.

It may be well to define some of the terms used.

1. *Birth*—The minimum period of gestation for which we knowingly accept a birth certificate in our statistics has been 6 months.
2. *Live Birth*—The criterion of a live birth has been respiration after complete birth, that is, after the complete extrusion of the fetus from the body of the mother.
3. *Stillbirth*—The child which has not breathed after complete birth is classed as stillborn.
4. *No Birth*—This term, as used in the tables herewith, includes cases of "abortion," "ectopic gestation," etc., and also those in which the woman was not delivered.

With regard to the definitions given of a "birth" and a "live birth," we apply the foregoing rules whenever the certificate contains the information which allows their use, though in many cases we have nothing to go on except the mere fact of registration as a "live birth" or "stillbirth."

Throughout this paper rates are computed on several different bases according to the purpose in view. For example, the rates for all puerperal deaths, regardless of their association with a birth or otherwise, are computed in the usual manner by their proportion to live births. Rates will also be found for maternal deaths associated with live births and stillbirths separately or with both combined, computed in each case on the number of live births or stillbirths or the aggregate of both as the case may be. In general, births are taken instead of confinements, the consequent difference in the rate being insignificant. In the comparison of deaths associated with single and multiple births, however, the rates are based on confinements. It is evident that no rate can be computed separately for those deaths not associated with

a birth, as we have not, and can probably never hope to have, a figure for the total number of pregnancies.

It will also be recognized that the results of an investigation of this sort, covering a country as extensive as Canada, with such varied conditions, climatic, economic, and social, and with a population comprising several racial stocks, is apt to contain biases due to unknown facts which may affect the classifications as well as the results. To take one example, as shown in Tables XII and XIII, the women reported with the 4th, 5th or 6th birth between the ages 25 and 30 are not likely to be representative of the various racial groups in the same proportion as those reported with their first birth at this age.

Table I shows that of the total of 1,300 deaths from puerperal causes in 1927, 642, or 49 per cent, were associated with a live birth, 256, or 20 per cent, with a stillbirth and 402, or 31 per cent, were not associated with either a live birth or a stillbirth. In 1928 the total number of deaths was 1,331 of which 636, or 48 per cent, were assigned to a live birth, 254, or 19 per cent, to a stillbirth, while the remaining deaths, reported as not being associated with a birth, numbered 441, or 33 per cent of the total. For the aggregate of the 2 years the deaths associated with a live birth were 49 per cent of the total, and with a stillbirth 19 per cent, while 32 per cent were associated with "no birth" as previously defined.

The death rate, calculated in the usual manner from the proportion of maternal deaths to the number of live births, was 5.6 in each of the years 1927 and 1928. If only those deaths associated with either a live birth or a stillbirth are considered, their proportion to the number of live births and stillbirths combined was 3.7 per 1,000 in 1927 and

TABLE I

DEATHS FROM PUERPERAL CAUSES ASSOCIATED WITH LIVE BIRTH, STILLBIRTH OR NO BIRTH, CANADA, 1927 AND 1928 (COMBINED)

Year	No. of deaths from puerperal causes				Death rates from puerperal causes			
	Total	Associated with			All deaths per 1,000 live births	Associated with live birth or stillbirth	Associated with live birth	Associated with stillbirth
		Live birth	Still-birth	No birth		Per 1,000 births	Per 1,000 live births	Per 1,000 stillbirths
1927.....	1,300	642	256	402	5.6	3.7	2.7	34.9
1928.....	1,331	636	254	441	5.6	3.6	2.7	33.5
Two years.	2,631	1,278	510	843	5.6	3.7	2.7	34.2

TABLE II

DEATHS FROM PUERPERAL CAUSES ASSOCIATED WITH LIVE BIRTH, STILLBIRTH OR NO BIRTH, BY PROVINCES, 1927 AND 1928 (COMBINED)

Provinces	No. of deaths from puerperal causes				Death rate from puerperal causes			
	Total	Associated with			Total per 1,000 live births	Associated with live birth or stillbirth	Associated with live birth	Associated with stillbirth
		Live birth	Still-birth	No birth		Per 1,000 births	Per 1,000 live births	Per 1,000 still-births
Canada	2,631	1,278	510	843	5.6	3.7	2.7	34.2
Prince Edward Island	15	10	1	4	4.3	3.1	2.9	11.5
Nova Scotia	133	72	26	35	6.0	4.3	3.3	36.4
New Brunswick	123	69	25	29	6.0	4.5	3.4	45.5
Quebec	847	417	163	267	5.1	3.3	2.5	36.7
Ontario	799	359	168	272	5.9	3.7	2.6	30.3
Manitoba	146	71	24	51	5.1	3.2	2.5	25.4
Saskatchewan	238	125	42	71	5.6	3.8	3.0	38.0
Alberta	201	100	41	60	6.6	4.5	3.3	44.9
British Columbia	129	55	20	54	6.3	3.6	2.7	32.7

3.6 in 1928. If on the other hand the deaths associated with live births are taken in proportion to the number of live births, and those associated with stillbirths in proportion to the number of stillbirths, the difference is very striking. Deaths associated with live births gave a rate of 2.7 per 1,000 for both 1927 and 1928, while those associated with stillbirths a rate of 35 per 1,000 in 1927 and 33.5 in 1928. This comparison of the rates for deaths associated with a live birth and of those associated with a stillbirth illustrates the recognized fact that in combating the prenatal conditions which result in a maternal death we are at the same time assisting in effecting a reduction in the number of children born dead.

In Table II the aggregate maternal mortality of each province for 1927 and 1928 combined is similarly presented under the same 3 divisions: Deaths associated with a live birth; deaths associated with a stillbirth; those cases in which "*no birth*" took place.

A discussion of the results of such an investigation by provinces would be too detailed for the purposes of this paper; furthermore the figures for the smaller provinces, particularly for Prince Edward Island, are not sufficiently large to give reliable results. It is noted, however, that the proportion of puerperal deaths not associated with a birth

TABLE III

DEATHS FROM SPECIFIED PUERPERAL CAUSES ASSOCIATED WITH LIVE BIRTH, STILLBIRTH OR NO BIRTH, CANADA, 1927 AND 1928 (COMBINED)

Int. List No.	Cause of death	Total	Associated with		
			Live birth	Still-birth	No birth
	All puerperal causes	2,631	1,278	510	843
143...	Accidents of pregnancy	203	20	13	170
144...	Puerperal hemorrhage	356	175	135	46
145...	Other accidents of labor	275	118	72	85
146...	Puerperal septicemia	887	516	88	283
147...	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	171	117	24	30
148...	Puerperal albuminuria and convulsions	640	261	160	219
149...	Following childbirth (not otherwise defined)	97	69	18	10
150...	Puerperal diseases of the breast	2	2	—	—

varied from 24 per cent in New Brunswick to 42 per cent in British Columbia.

In every province the rate for deaths associated with stillbirths is much higher than for those associated with live births, ranging generally from 10 to 15 times as high, when the rate for each of the 2 classes is computed on its appropriate denominator.

Table III gives the deaths associated with a live birth, a stillbirth, or no birth, classified according to the cause of death; and Table IV shows the proportional distribution of the deaths from each cause among these 3 categories.

TABLE IV

PROPORTION OF DEATHS FROM SPECIFIED PUERPERAL CAUSES WHICH WAS ASSOCIATED WITH LIVE BIRTH, STILLBIRTH OR NO BIRTH, CANADA, 1927 AND 1928 (COMBINED)

Int. List No.	Cause of death	Total	Associated with		
			Live birth	Still-birth	No birth
	All puerperal causes	1,000	486	194	320
143...	Accidents of pregnancy	1,000	98	64	837
144...	Puerperal hemorrhage	1,000	492	379	129
145...	Other accidents of labor	1,000	429	262	309
146...	Puerperal septicemia	1,000	582	99	319
147...	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	1,000	684	140	175
148...	Puerperal albuminuria and convulsions	1,000	408	250	342
149...	Following childbirth (not otherwise defined)	1,000	711	186	103
150...	Puerperal diseases of the breast	1,000	1,000	—	—

Table IV exhibits for certain causes interesting variations in the proportion of deaths associated with a live birth, a stillbirth, or no birth. For instance, 49 per cent of the women who died from puerperal hemorrhage had a child born alive, while in 38 per cent the child was stillborn, and in 13 per cent there was no birth. For other accidents of labor the percentage of live births was 43, stillbirths 26, and no birth 31. The proportion of deaths from puerperal septicemia associated with a live birth was high, 58 per cent, while only 10 per cent were associated with a stillbirth; but deaths with no birth amounted to 32 per cent, evidence of the part which abortions play in swelling the total deaths from this cause. Deaths from phlegmasia alba dolens and embolism were associated with live births to a high degree, 68 per cent, while in only 17.5 per cent no birth took place. Where puerperal albuminuria and convulsions were the cause of death, live births were reported for 41 per cent, stillbirths 25 per cent, and no birth 34 per cent.

Table V gives the death rates per 10,000 births from each cause, column 1 covering all deaths and basing the rates on the proportion to live births after the usual manner; column 2 gives the proportion of deaths associated with live births to the total of live births and column 3 the deaths associated with stillbirths. It will be observed by a comparison of columns 2 and 3 that the proportion of the rate for deaths

TABLE V

DEATH RATES FROM SPECIFIED PUERPERAL CAUSES, AND RATES FOR DEATHS ASSOCIATED WITH LIVE BIRTH OR STILLBIRTH BASED ON NUMBER OF LIVE BIRTHS OR STILLBIRTHS, CANADA, 1927 AND 1928 (COMBINED)

Int. List No.	Cause of death	All deaths	Deaths associated with live birth	Deaths associated with stillbirth
		Rate per 10,000 live births	Rate per 10,000 live births	Rate per 10,000 stillbirths
	All puerperal causes	56	27	342
143...	Accidents of pregnancy	4	(1)	9
144...	Puerperal hemorrhage	8	4	91
145...	Other accidents of labor	6	3	48
146...	Puerperal septicemia	19	11	59
147...	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	4	2	16
148...	Puerperal albuminuria and convulsions	14	6	107
149...	Following childbirth (not otherwise defined)	2	1	12
150...	Puerperal diseases of the breast	(1)	(1)	—

1. Rate less than 1 per 10,000 live births

TABLE VI

TOTAL DEATHS FROM SPECIFIED PUERPERAL CAUSES, CLASSIFIED AS INSTITUTIONAL AND NON-INSTITUTIONAL, CANADA, 1927 AND 1928 (COMBINED)

Int. List No.	Cause of death	Number of deaths			Rate per 10,000 live births		
		Total	Institutional	Non-institutional	Total	Institutional	Non-institutional
	All puerperal causes	2,631	1,256	1,375	56	131	37
143...	Accidents of pregnancy	203	110	93	4	11	2
144...	Puerperal hemorrhage	356	108	248	8	11	7
145...	Other accidents of labor	275	146	129	6	15	3
146...	Puerperal septicemia	887	498	389	19	52	10
147...	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	171	59	112	4	6	3
148...	Puerperal albuminuria and convulsions	640	312	328	14	32	9
149...	Following childbirth (not otherwise defined)	97	23	74	2	2	2
150...	Puerperal diseases of the breast	2	—	2	(1)	—	(1)

1. Rate less than 1 per 10,000 live births

associated with stillbirths to that for deaths associated with live births is particularly heavy in connection with puerperal hemorrhage, other accidents of labor, and puerperal albuminuria and convulsions, and comparatively light for puerperal septicemia and phlegmasia alba dolens and embolism.

Table VI divides deaths according as they took place inside or outside an institution. The rates have been calculated for each cause based on 10,000 live births. Almost throughout the list of causes the institutional death rates are much higher than non-institutional. Such a comparison must be made with reservations, as in many instances hospitalization has taken place only when the outlook for a successful termination was doubtful. This appears to have happened in many cases where a death has been classified to "Accidents of Pregnancy," which investigation showed to have been incidental to an abortion *extra mural* in origin. Similar considerations apply to the rate for puerperal septicemia which for institutions was over 5 times as high as the non-institutional rate. Other causes also show an apparent bias against institutions.

To make a fairer comparison, Table VII takes in only those deaths which were associated with live births and compares the rates by causes as between institutional and non-institutional deaths. Even here it must be remembered that in many cases the woman may have been

TABLE VII

DEATHS FROM SPECIFIED PUERPERAL CAUSES ASSOCIATED WITH A LIVE BIRTH, CLASSIFIED AS INSTITUTIONAL AND NON-INSTITUTIONAL, CANADA, 1927 AND 1928 (COMBINED)

Int. List No.	Cause of death	Number of deaths			Rate per 10,000 live births		
		Total	Institutional	Non-institutional	Total	Institutional	Non-institutional
	All puerperal causes	1,278	536	742	27	56	20
143	Accidents of pregnancy	20	6	14	(1)	1	(1)
144	Puerperal hemorrhage	175	45	130	4	5	3
145	Other accidents of labor	118	60	58	3	6	2
146	Puerperal septicemia	516	252	264	11	26	7
147	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	117	40	77	2	4	2
148	Puerperal albuminuria and convulsions	261	120	141	6	12	4
149	Following childbirth (not otherwise defined)	69	13	56	1	1	1
150	Puerperal diseases of the breast	2	—	2	(1)	—	(1)

1. Rate less than 1 per 10,000 live births

TABLE VIII

INSTITUTIONAL AND NON-INSTITUTIONAL BIRTHS FOR CERTAIN TYPICAL OCCUPATIONS OF FATHERS, CANADA, 1929

Occupation of father	Numerical distribution			Per cent distribution		
	Total	Institutional	Non-institutional	Total	Institutional	Non-institutional
All occupations	242,981	60,349	182,632	100.0	24.8	75.2
Owners, managers, etc.	1,850	771	1,079	100.0	41.7	58.3
Professional workers	5,298	2,988	2,310	100.0	56.4	43.6
Office employees (including government and municipal)	7,913	3,841	4,072	100.0	48.5	51.5
Laborers, agriculture	1,055	198	857	100.0	18.8	81.2
" other	40,191	5,230	34,961	100.0	13.0	87.0
Farmers	75,155	11,383	63,772	100.0	15.1	84.9
Fishermen	2,824	196	2,628	100.0	6.9	93.1
Shantymen	1,312	407	905	100.0	31.0	69.0
Miners and quarrymen	4,089	976	3,113	100.0	23.9	76.1
Manufacturing employees	27,739	8,249	19,490	100.0	29.7	70.3
Building trades	15,938	3,758	12,180	100.0	23.6	76.4
Steam railway employees	4,916	1,799	3,117	100.0	36.6	63.4
Electric railway employees	868	214	654	100.0	24.7	75.3
Chauffeurs, drivers, etc.	7,625	2,189	5,436	100.0	28.7	71.3
Salesmen in stores, etc.	4,781	2,626	2,155	100.0	54.9	45.1
Other occupations	33,380	11,116	22,264	100.0	33.3	66.7
Occupation not given	7,726	4,306	3,420	100.0	55.7	44.3
No occupation	321	102	219	100.0	31.8	68.2

brought to the institution owing to a serious condition following a birth outside. There is also a probability that the confinements in institutions included an undue proportion of cases in which some serious condition indicated the advisability of hospitalization.

The disparity between the rates for institutional and non-institutional deaths, while still existing in a fairly marked degree, has been greatly lessened by the inclusion only of deaths associated with live births. The rate for all causes combined, 3.5 times as great for institutions when all puerperal deaths were considered, is only 2.8 times as great when the comparison is limited to deaths associated with live births. In deaths from "Other Accidents of Labor," in which the proportion was 5 to 1 in the former case, it is only 3 to 1 in the latter. For puerperal septicemia it has been reduced from more than 5 to 1 to less than 4 to 1.

In Table VIII a digression has been made to illustrate hospitalization in relation to occupation of father. In comparing institutional with non-institutional rates it should be remembered that women whose confinement occurs in institutions are not proportionately representative of all classes in the community. A tabulation of institutional and

TABLE IX

MATERNAL DEATHS ASSOCIATED WITH A LIVE BIRTH OR A STILLBIRTH, CLASSIFIED ACCORDING TO PERIOD ELAPSING BETWEEN BIRTH OF CHILD AND DEATH OF MOTHER, CANADA, 1927 AND 1928 (COMBINED)

(Absolute figures)

Int. List No.	Cause of death	Total	Under 1 day	1 day and under 1 week	1 week and under 2 weeks	2 weeks and under 3 weeks	3 weeks and under 1 month	1 month and under 3 months	3 months and under 6 months	6 months and over	Period not known
	All puerperal causes	1,789	480	462	310	132	94	82	7	3	219
143..	Accidents of pregnancy	34	12	8	4	2	1	—	—	—	7
144..	Puerperal hemorrhage	310	179	44	15	5	5	—	—	1	61
145..	Other accidents of labor	190	60	81	13	5	2	3	1	—	25
146..	Puerperal septicemia	604	20	116	193	78	61	52	5	—	79
147..	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	141	41	21	28	18	10	9	—	1	13
148..	Puerperal albuminuria and convulsions	421	143	167	43	15	12	10	1	—	30
149..	Following childbirth (not otherwise defined)	87	25	25	14	9	3	6	—	1	4
150..	Puerperal diseases of the breast	2	—	—	—	—	—	2	—	—	—

TABLE X

MATERNAL DEATHS ASSOCIATED WITH A LIVE BIRTH OR A STILLBIRTH, CLASSIFIED ACCORDING TO PERIOD ELAPSING BETWEEN BIRTH OF CHILD AND DEATH OF MOTHER, CANADA, 1927 AND 1928 (COMBINED)

(Per cent distribution)

Int. List No.	Cause of death	Total	Under 1 day	1 day and under 1 week	1 week and under 2 weeks	2 weeks and under 3 weeks	3 weeks and under 1 month	1 month and under 3 months	3 months and under 6 months	6 months and over
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
	All puerperal causes	100.0	30.6	29.4	19.7	8.4	6.0	5.2	0.4	0.2
143..	Accidents of pregnancy	100.0	44.4	29.6	14.8	7.4	3.7	—	—	—
144..	Puerperal hemorrhage	100.0	71.9	17.7	6.0	2.0	2.0	—	—	0.4
145..	Other accidents of labor	100.0	36.4	49.1	7.9	3.0	1.2	1.8	0.6	—
146..	Puerperal septicemia	100.0	3.8	22.1	36.8	14.9	11.6	9.9	1.0	—
147..	Puerperal phlegmasia alba dolens, puerperal embolism, sudden death in puerperium	100.0	32.0	16.4	21.9	14.1	7.8	7.0	—	0.8
148..	Puerperal albuminuria in convulsions	100.0	36.6	42.7	11.0	3.8	3.1	2.6	0.3	—
149..	Following childbirth (not otherwise defined)	100.0	30.1	30.1	16.9	10.8	3.6	7.2	—	1.2
150..	Puerperal diseases of the breast	100.0	—	—	—	—	—	100.0	—	—

non-institutional births for certain typical occupations of the father, made for the year 1929, illustrates this point (Table VIII). It may be assumed that the years 1927 and 1928 would show similar differences between the various occupations in regard to the proportion of births occurring in institutions. A very small proportion of the children of fishermen, farmers and laborers were born in institutions. On the other hand, the proportion was high for professional workers, salesmen in stores, office employees, and owners and managers, these ranking in the order named. The births for which the occupation of the father was not given were nearly all to unmarried mothers. The proportion of these occurring in institutions was high.

Table VIII should not be accepted as furnishing conclusive evidence on hospitalization, but will accomplish a useful purpose if it stimulates further investigation.

In Table IX the puerperal deaths associated with live births or stillbirths have been classified by causes and by the time elapsing between the birth and the mother's death. Table X gives the corre-

TABLE XI

PUERPERAL DEATHS OF MARRIED MOTHERS ASSOCIATED WITH A LIVE BIRTH OR A STILLBIRTH, BY AGE OF MOTHER AND ORDER OF BIRTH, CANADA, 1927 AND 1928 (COMBINED)

(Absolute figures)

Age of mother	All births	Order of birth						
		1st child	2d child	3d child	4th to 6th child	7th to 9th child	10th child or higher order	Order of birth not known
All ages	1,731	458	195	146	332	222	207	171
Under 20 years	70	54	8	3	1	—	—	4
20–24 "	310	162	62	26	32	2	—	26
25–29 "	363	107	51	49	94	22	1	39
30–34 "	374	74	34	29	105	72	22	38
35–39 "	373	41	32	24	69	86	91	30
40–44 "	213	17	8	12	28	35	83	30
45 years and over	28	3	—	3	3	5	10	4

sponding per cent distribution by elapsed periods. In all some 31 per cent of the deaths occurred within 24 hours after delivery. The percentage should be somewhat higher, as in those cases where the mother's death took place the day after the birth and no information as to the number of hours was available, it was assumed that 1 day had elapsed. Sixty per cent of the deaths occurred within 1 week, roughly 20 per cent in the 2d week, and the remainder were scattered over longer periods with less than 1 per cent taking place more than 3 months after the birth.

Of the deaths from puerperal hemorrhage, 72 per cent occurred on the 1st day, while only 4 per cent due to puerperal septicemia took place within this period, and 11 per cent more than a month after the birth. Deaths from puerperal albuminuria and convulsions occurred on the 1st day in some 37 per cent of the cases and within 1 week in 79 per cent.

Table XI classifies the puerperal deaths of married mothers which were associated with a live birth or a stillbirth according to the order of the birth in conjunction with the age of the mother. A presentation of Birth Statistics in the Canadian Annual Reports, from which the required figures for the age of mother and order of birth of the child have been extracted to form Table XII, has made it possible to present the rates for each category in Table XIII. The rates for very young mothers for higher orders of birth and those for mothers near the upper limit of the childbearing ages for lower orders are naturally based on a comparatively small number of births, and may be con-

TABLE XII

BIRTHS (INCLUDING STILLBIRTHS) TO MARRIED MOTHERS, BY AGE OF MOTHER AND ORDER OF BIRTH, CANADA, 1927 AND 1928 (COMBINED)

Age of mother	All births	Order of birth						
		1st child	2d child	3d child	4th to 6th child	7th to 9th child	10th child or higher order	Order of birth not stated
All ages	471,229	101,719	82,774	65,343	124,796	58,961	36,947	689
Under 20 years	23,602	17,745	4,841	861	150	—	—	5
20–24 "	111,875	46,198	33,293	18,553	13,308	466	28	29
25–29 "	127,400	24,380	25,824	23,514	44,463	8,520	667	32
30–34 "	102,142	9,094	12,699	14,229	38,163	21,992	5,932	33
35–39 "	72,727	3,223	4,847	6,537	21,894	20,158	16,045	23
40–44 "	28,920	771	1,084	1,426	6,139	7,020	12,469	11
45 years and over	3,150	62	62	105	475	694	1,750	2
Age not stated	1,413	246	124	118	204	111	56	554

sidered as not forming a typical cross-section of the married women of these ages. Rates which for these reasons were considered unreliable have therefore been omitted, and others which, although included, are based on fewer than 2,000 births are indicated by a footnote.

The lowest mortality rates for all orders of birth combined are for mothers between the 20th and 30th birthdays, with 2.8 maternal deaths per 1,000 births. Mothers under 20 show somewhat higher rates, and

TABLE XIII

PUERPERAL DEATHS OF MARRIED MOTHERS ASSOCIATED WITH A LIVE BIRTH OR A STILLBIRTH, BY AGE OF MOTHER AND ORDER OF BIRTH, CANADA, 1927 AND 1928 (COMBINED)

(Rate per 1,000 births)

Age of mother	All births	Order of birth					
		1st child	2d child	3d child	4th to 6th child	7th to 9th child	10th child or higher order
All ages	3.7	4.6	2.6	2.5	3.1	4.5	6.2
Under 20 years	3.0	3.0	2.3	(1)	(1)	—	—
20–24 "	2.8	3.6	2.1	1.7	3.2	(1)	—
25–29 "	2.8	4.6	2.3	2.4	2.5	3.1	(1)
30–34 "	3.7	8.1	2.9	2.3	3.1	3.9	4.0
35–39 "	5.1	12.7	6.6	3.7	3.5	5.0	6.1
40–44 "	7.4	22.0 (2)	7.4 (2)	9.1 (2)	6.0	6.3	7.5
45 years and over	8.9	(1)	—	(1)	(1)	(2) 8.6	(2) 7.4

1. Rates not computed on account of smallness of numbers involved
2. Rates based on fewer than 2,000 births

each 5-year age group above 30 shows an increase as compared with the group below it until a rate of 8.9 per 1,000 is reached for mothers 45 and over.

For primiparae the lowest rate is 3.0 per 1,000 for mothers under 20. The rates for 1st births mount with each increase in age until a figure of 22 per 1,000 is reached for women between the 40th and 45th birthdays. This last rate is based on fewer than 2,000 births.

For the 2d and 3d child, women between the 20th and 25th birthdays have the lowest rates, 2.1 and 1.7 per 1,000 respectively. For the 2d child the rate for mothers under 20 is the same as for those between the 25th and 30th birthdays. For both of these orders of birth the rates show a general tendency to increase with the advancing age of the mother, but the proportion of the rates near the upper limit of childbearing ages to the minimum rate is in each case less than for primiparae.

For the 4th, 5th and 6th children taken together, the lowest rate is found for mothers between the 25th and 30th birthdays. For the 7th, 8th and 9th children taken together, the first significant rate is for women 25 to 29, and the rate increases progressively from this group with the advancing age of the mother. The same tendency is manifest in the rates for the 10th child or higher order, for which the first significant rate and the lowest of those computed is for women between the 30th and 35th birthdays.

When order of birth is considered for the separate age groups, the rate for primiparae is in every case where listed much higher than for the other orders which have significant figures. For women between 20 and 35 the general tendency appears to be the approach to a minimum rate for the 3d child; for women between 35 and 45 the minimum rate is for the 4th, 5th and 6th children.

The lowest rate in the table is for women between the 20th and 25th birthday bearing the 3d child—1.7 per 1,000 births, based on 18,553 births.

To compare the risk in single and multiple confinements, the rate of maternal mortality has been computed for each of these classes with results as follows:

RATES FOR SINGLE AND MULTIPLE CONFINEMENTS

	Confinements	Deaths	Rate per 1,000
Single	473,832	1,719	3.6
Multiple	5,977	69	11.5
Total	479,809	1,788	3.7

Rate for multiple confinements is more than 3 times that for single.

Of the 1,789 deaths associated with live births or stillbirths, 884 were associated with male births, single or multiple, 792 with female births, 20 with twins or triplets of both sexes, and 93 sex not known. Taking only the 884 deaths associated with male births and the 792 associated with female births, and using male and female births respectively as denominator, we obtained rates of 3.5 and 3.4 per 1,000 respectively. Treating the deaths associated with live births separately, we obtained a rate of 2.4 with male births and 2.6 with female births. On the other hand, the deaths associated with stillbirths show a higher rate with male births than with female, the figures being 35.5 and 29.9 respectively.

In Table XIV, puerperal deaths have been listed according to the racial origin of the decedent and a rate for each origin calculated per 1,000 live births; also for deaths from puerperal septicemia. The deaths have been divided according to whether they were associated with a live birth, a stillbirth or no birth, and a percentage distribution based on these figures. Of the chief racial origins, the Scottish have a

TABLE XIV

MORTALITY FROM PUERPERAL CAUSES BY RACIAL ORIGIN, CANADA, 1927 AND 1928 (COMBINED)

Racial origin of decedent	All deaths from puerperal causes		Deaths from puerperal septicemia		Deaths associated with				Per cent of deaths associated with		
					Live birth		Stillbirth	No birth			
	No.	Rate per 1,000 live births	No.	Rate Per 1,000 live births	No.	Rate per 1,000 live births	No.	No.	Live birth	Stillbirth	No birth
All origins	2,631	5.6	887	1.9	1,278	2.7	510	843	48.6	19.4	32.0
English	664	6.1	220	2.0	312	2.9	117	235	47.0	17.6	35.4
Irish	257	6.3	78	1.9	121	3.0	61	75	47.1	23.7	29.2
Scotch	308	6.6	92	2.0	134	2.9	65	109	43.5	21.1	35.4
French	921	4.9	315	1.7	470	2.5	183	268	51.0	19.9	29.1
Austrian	24	8.1	14	4.7	12	4.0	2	10	50.0	8.3	41.7
Dutch	22	5.2	7	1.7	11	2.6	7	4	50.0	31.8	18.2
German	101	4.8	38	1.8	47	2.2	20	34	46.5	19.8	33.7
Indian	58	11.0	15	2.9	46	8.7	2	10	79.3	3.4	17.2
Italian	19	3.9	6	1.2	9	1.8	3	7	47.4	15.8	36.8
Jewish	13	3.2	5	1.2	4	1.0	3	6	30.8	23.1	46.2
Norwegian	21	5.6	9	2.4	8	2.1	5	8	38.1	23.8	38.1
Polish	31	6.5	16	3.3	14	2.9	8	9	45.2	25.8	29.0
Russian	37	8.4	10	2.3	19	4.3	5	13	51.4	13.5	35.1
Swedish	17	6.2	5	1.8	12	4.4	1	4	70.6	5.9	23.5
Ukrainian	53	4.9	20	1.9	25	2.3	12	16	47.2	22.6	30.2
Other origins	81	5.5	37	2.5	32	2.2	15	34	39.5	18.5	42.0
Not specified	4	1.4	—	—	2	0.7	1	1	50.0	25.0	25.0

death rate of 6.6 per 1,000 live births, Irish 6.3, English 6.1, and French 4.9, compared with the general death rate from puerperal causes of 5.6 per 1,000.

The highest death rate is for mothers of Indian origin, amounting to 11 per 1,000, though this rate is probably affected by the more incomplete registration of Indian births. Other high rates are for women of Russian and Austrian origin, while Ukrainians give 4.9 per 1,000, well below the average. The term "Austrian" is somewhat ambiguously used, and usually refers to Slavic people from the former Austro-Hungarian Empire or their descendants. There seems no particular reason why this description should be favored more on death than on birth certificates, but it might be safer to consider the rate for decedents of Russian, Austrian, and Ukrainian origins as one total. The rate thus calculated is 6.3 per 1,000.

Women of Jewish origin show the lowest death rate, 3.2 per 1,000, and are closely followed by Italian women with a rate of 3.9 per 1,000, each based on approximately 5,000 births. Both Jewish and Italian women show a very low death rate from puerperal septicemia. Only 37 per cent of the deaths of Italian women were not associated with a birth, as compared with 46 per cent for those of Jewish origin, a high figure for the latter when considered with their low death rate and particularly with the low rate from puerperal septicemia. The number of deaths is small, and for this reason the interpretation doubtful.

In spite of the high death rate of Indian women, only 17 per cent of the deaths were not associated with a birth.

In addition to the deaths which were assigned to puerperal causes, there were in the 2 years 439 deaths assigned to other causes, but for which the medical certificates or replies to inquiries made mention of a recent pregnancy or parturition. These 439 deaths would give a rate of 0.9 per 1,000 live births, and added to the 2,631 deaths directly attributed to puerperal causes, would make a total of 3,070 deaths of women associated with pregnancy or childbirth, a rate of 6.5 per 1,000 live births. Of these 222, or 51 per cent, were associated with a live birth, 63, or 14 per cent, with a stillbirth, and 154, or 35 per cent, no birth. The proportion of these deaths not associated with a birth, and that with a live birth, were slightly higher than in the case of deaths attributed directly to puerperal causes, while a considerably smaller percentage of them was associated with a stillbirth.

Among the 439 deaths were 14 resulting from criminal abortion. These are classified as homicides.

The Montreal Water Supply*

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IN the year 1800, The Montreal Aqueduct was formed and received a 50-years franchise for the installation of a gravity system situated near Côte-des-Neiges, consisting of a wooden cistern with spring water fed by a wooden pipe. Today Montreal has 1,250,000 inhabitants and the St. Lawrence River provides its water supply.

What has happened during this 131 years would be too long to enumerate, but it is interesting to note the successive additions, taking advantage of progress both in machinery, pipes, and aqueduct system in general. In 1920, Montreal, having approximately 1,000,000 population, was in possession of an aqueduct system, taking its water from the St. Lawrence River through a canal 7 miles long, and had for the main pumping station a steam plant composed of various units of different sizes and makes. This station required approximately 80 men to operate it.

An event at the end of 1919 precipitated a radical change, and today the whole water supply of Montreal is pumped through modern electrically driven pumping stations of various stages. The event referred to was a general strike of the employees of the Montreal Aqueduct, which took place on New Year's eve, 1919, when the temperature was 20 to 25° below zero F. The strike lasted approximately 3 days, and Montreal was only saved from calamity by the sporting spirit of the citizens of all classes and ranks who volunteered to operate the steam plants, thus, under terrific handicap, keeping the water supply uninterrupted.

Soon after this the Montreal Water Board was formed, with recommendation to establish for the city a modern aqueduct system which could be operated safely and efficiently with a minimum of men, so avoiding a repetition of the trouble experienced in the winter of 1919. It is this system that I will briefly describe.

As stated previously, the St. Lawrence River is the source of supply for this aqueduct, and through the gates of Lasalle Bridge, the water is

* Read before the Public Health Engineering Section of the American Public Health Association at the Sixtieth Annual Meeting at Montreal, Canada, September 17, 1931.

delivered to the filtration plant by a canal approximately 7 miles long, 200 ft. wide, and 20 ft. deep. The reason for this large canal is that ultimately the city will develop power from it which will be used for various purposes by the municipal authorities.

A filtration plant is located on the south side of the canal on land belonging to the city, and in the territory of the municipality of Verdun. This plant consists of 3 batteries of rapid sand filters of 50 m.g.d. each, and 1 slow sand filter battery of the same capacity, so that it is possible to operate at a capacity of 200 m.g.d., though, at present, it is operated at the daily rate of approximately 125 m.g.d. The water is pumped by low lift pumps from the canal over the filter, as it was found more economical to do so, instead of depressing the filters to feed them by gravity through the canal and pump the wash water through the sewer system of the city.

A lateral conduit of 9 ft. diameter is also available and having its intake approximately 1,000 ft. from shore, is capable of delivering approximately 100 m.g.d. of St. Lawrence water proper, as the north shore of the St. Lawrence water adjacent to the canal carries more or less of a mixture of Ottawa and St. Lawrence water, which is different from the St. Lawrence water, strictly speaking. It has more color and less alkalinity, and would require ultimately treatment by coagulation. However, up to the present, and under the supervision of the Provincial Board of Health, it has not been found necessary to coagulate the water of the Montreal Aqueduct, but the problem has been studied and plans have been prepared for coagulation basins, alum mixing plant, etc., so that when the quality of water supply may be judged by the Board of Health to warrant such a measure, the structures, basins, etc., can be built to be operated in conjunction with the present filtration plant.

Up to the present, owing to the excellent nature of the river water, we are only filtering the water supply through the rapid sand filters and after chlorinating the filtered water, it is found to be safe and absolutely suitable for domestic purposes. It is seen, that under the present methods, with the cost of coagulation eliminated, the Montreal water supply is treated at very reasonable expense, and this aqueduct is one of the most economical to operate on this continent.

Leaving the filter, the water is stored in a 26 m.g. underground reservoir, located between the filtration plant and the pumping station. This reservoir acts as a stabilizer between the constant output of the low level pumping units and the intermittent and irregular flow of the filter plant. It is equipped with a structure called the depressed bay, by which the complete reservoir may be put out of service for repair or

disinfection, and the water supply restored to the low level pumps by means of the emergency conduit tapped directly into the canal, and through which chlorinated water can be obtained to feed all the pumps of the low level pumping station during the time the reservoir or filtration plant is out of commission.

Special features of this conduit in regard to baffle plants, separation, etc., allow perfect feed of each individual pump, as well as the possibility, even under ordinary operation, of access to the suction of each pump separately.

LOW LEVEL PUMPING STATION

Owing to the various elevations upon which Montreal is built, it has been found necessary to divide the city into three zones, namely, the low level, the high level, and the high pressure zone.

The low level district or zone is supplied through the low level pumping station, which pumps directly into the mains of this low level zone, and to the McTavish reservoir which acts upon the low level system as an accumulator in which the difference of the water between consumption and the pumpage is stored. This reservoir has a capacity of 48 m.g. and is located on the side of the mountain.

The low level pumping station, which pumps the total supply of water, consists of a building in which electrical equipment is installed to control and operate six 30 m.g.d. pumps, driven by electrical motors; the ultimate capacity of the station is twelve such pumps.

The Montreal Water Board is actually finishing plans and specifications for the enlargement of this station where three 30 m.g.d. pumps will be installed, bringing up the total of pumps to nine. This station is operated by electricity. The electrical energy is delivered by two transmission lines and a third stand-by line, all being connected to a high tension loop of a power company having 4 to 5 large hydro-electrical plants located in various parts of the province and connected to different sections of this loop. The capacity of such a loop is more than 250,000 kilowatts.

Owing to the disposition described, the low level pumping station has been in operation for over 10 years, and it has never been found necessary to utilize the steam turbo-generator plant at its disposal through the power contract between the city and the power company.

The transmission lines are subdivided at the entrance of the plant in six 3-phase cables, two of which are suitable for the total load. In every circuit breaker, bus-bars are installed in duplicate and all precautions have been taken for quick repair, to prevent careless starting of motors. With the centralized control equipment located on 2 bench

boards, 2 operators only are necessary to keep this main pumping station in operation. Special features of protection both electric and hydraulic have been included in the equipment and have made the operation of this station almost fool-proof.

DISTRIBUTION CONTROL BUILDING

The water pumped by the low level pumps is distributed by 3 headers of 72″ diameter into a building called the distribution control. In this building six 48″ mains are so interconnected that with 1 header alone in operation, all mains can be fed with water, and as all the valves controlling these mains, and transfer valves from one main to another, are located in this building and are electrically operated from the main bench board of the station, the transfer of water distribution which may be necessitated by break or accidents in town can be taken care of by the operator on the hydraulic bench board of the low level pumping station.

Owing to the severe cold prevailing in the winter in Montreal, it has been found preferable to locate main valves in well protected, heated buildings in order to gain quick access to them instead of outdoors in chambers located at suitable points.

The six 48″ mains deliver the water to the various parts of the city and, as stated above, some of these mains deliver water to the McTavish reservoir, which serves also as a suction well for the six pumps of the McTavish Pumping Station, which are repumping the water to the high level zone, having as a stabilizer the Côte-des-Neiges reservoir, as well as the Peel Street reservoir, to act on the distribution mains of the high level zone in order to take care of the difference of water between the consumption and the pumpage at McTavish Pumping Station. This McTavish Pumping Station also repumps the water into the Outremont reservoir and Outremont district in the same manner as it pumps water in the Côte-des-Neiges reservoir.

As an additional explanation we must say that recently the City of Montreal has purchased the Montreal Water & Power company which operated an aqueduct system similar to, but smaller in size than the one of the city, and in order to limit the pumpage for the two aqueducts to the low level pumping station and McTavish Pumping Station, it was necessary to redesign somewhat the main piping of the Montreal Water and Power Company, in order to convey the water to its former reservoirs, namely, Côte-des-Neiges and Outremont, by means of the McTavish reservoir and the new McTavish Pumping Station which take care of these services. Previously, the Peel Street reservoir was the only one acting upon the city high level zone, but now through

new connections the Côte-des-Neiges reservoir will take the place of the Peel Street reservoir, adding storage capacity to the system as well as increasing its pressure by approximately 20 lbs.

MCTAVISH PUMPING STATION

The McTavish Pumping Station has been recently constructed and is just being put in operation. It consists of three 12 m.g.d. pumps repumping water from the McTavish reservoir into the Côte-des-Neiges reservoir and three 15 m.g. pumping units repumping water from the McTavish reservoir into the Outremont reservoir. These six pumps are located in one room. They have been designed in such a way as to be all interchangeable, as regards to bearings, shafts, and bed plates, but not impellers because of the different characteristics of the service, or of the different curvature and width. Each of these two classes of pumps can be increased by changing the impeller from 12 million to 15 million for the Côte-des-Neiges service and from 15 to 18 million for the Outremont service.

This station is operated by means of two 3-phase cables installed between it and the Atwater Street station of the power company and connected to the high-tension loop referred to above, one cable being sufficient for the load, the other being kept as a reserve.

Besides these two cables, another source of supply through another cable is delivering energy at the McTavish from Vallée Street substation of the power company. With these three sources of power supply, the service of this station is expected to be as good as that of the low level pumping station. The electrical equipment is laid out in duplicate for oil circuit breakers, bus-bars, and affords a possibility of quick repair. The motors operating the six pumps are six 1,000 h.p. synchronous type, and capable of power factor correction up to 80 per cent leading power factor. The starting of these motors is done automatically and in case of interruption, we expect that this station operating two different services will be put back in service in the minimum time and without line disturbances.

HIGH PRESSURE ZONE

The high pressure zone is served by electrically driven pumping stations, one located at the Côte-des-Neiges reservoir which repumps the water of this reservoir into the system, having a small reservoir on top of the Westmount mountain to take care of the difference in the water between the consumption and the pumpage.

Another electrically driven pumping station located on Cedar Avenue pumps the water into its system, having a small reservoir on the

Montreal mountain to take care of the difference between the consumption and the pumpage.

The Montreal Water Board is now making plans and specifications for a similar pumping station and reservoir system to be installed in connection with the Outremont reservoir and to feed the upper part of the second Montreal mountain back of the University of Montreal. These stations will be made automatic owing to their smaller size.

This is in general a description of the Montreal Water Supply system. In reference to the distribution mains, until now they consisted mostly of cast iron and steel pipes, but recently reinforced concrete pipes have been used for higher pressures in order to avoid the bursting of cast iron pipes, and the corrosion affecting steel pipes, and electrolysis in both cases.

The Montreal Water Board is now installing a 34″ reinforced concrete main between the McTavish reservoir and the Côte-des-Neiges reservoir.

In reference to water hammer, this question, after being carefully studied, has been solved by the use of Johnson valves. These, sometimes called " needle valves," consist of a plunger acting in a cylindrical chamber, and by moving this plunger back and forth, the valve is either closed or open. The operation of these valves is hydraulic and also electrical. The control device is arranged in such a manner that under an interruption of power the valve closes three-quarters of its stroke in a few seconds and the remaining quarter in a time adjusted to be between 5 to 10 seconds, thus eliminating the water hammer. In other words, these valves act as slow closing check valves. We have in the low level pumping station 18 of these and in the McTavish Pumping Station 8. Similar valves will be installed in various parts of the city, so as to close automatically sections of the distribution system in case of a break or trouble.

CHLORINATION OF WATER

Our chemist and filtration plant superintendent have been working for many years on a chlorinating device of very different nature from the ones generally in use. This chlorinator is based on the faculty of a photo-electric cell to change its resistance in proportion to the light it receives.

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BOVINE TUBERCULOSIS AND HUMAN HEALTH

A REPORT of more than usual interest has recently appeared.[1] At the London Congress on Tuberculosis in 1901, Robert Koch lent his great authority to the belief that bovine tuberculosis did not constitute a menace to human health. While there were those at the Congress who combated his position, it was not until 1902[2] that positive proof, such as had been demanded by Koch, was given that the bovine organism could produce tuberculosis in human beings. Two National Commissions, one English and the other German, have since confirmed the fact that bovine tuberculosis is transmissible to human beings, and it is safe to say that there is no one in the world today who ranks as an authority who does not admit the fact, though there is still some question over the actual amount of human tuberculosis due to infection from bovine sources. Thirty years have passed since the positive proof was given. In the meantime, many private workers have given added testimony and it seems curious that there are still so many people who ignore or belittle the danger of cattle to human beings as a source of tuberculosis.

The report in question states that while the incidence of bovine tuberculosis varies, in some places it is responsible for between 10 and 15 per cent of the cases of tuberculous bones and joints, and urges that this source of infection be more carefully guarded against. It states further that of children under 5 years of age suffering from tuberculo-

sis, 21 per cent of the cases are due to the bovine type of organism, while between the ages of 5 and 16 the percentage rises to 26.

It seems needless to add that pasteurization is at present our greatest safeguard, though the difficulties of having this process carried out properly in rural sections and in small towns are evident. Federal, state, and city governments have played a large and commendable part in bringing about as good conditions as now exist, but it is evident that much remains to be done.

An interesting observation quoted from Dr. Maxwell Harbin, of Western Reserve University, is that there has been a steady decrease in tuberculous disease of bones and joints in children, but an increase in adults. He attributes this as being probably due to the protection given by public health measures during childhood, and expresses the fear that due to the depression through which the country is now passing, public health activities may be let down and the situation be changed. His opinion is apparently shared by a number of other investigators in various parts of the country.

Certainly we have here a strong incentive for urging health authorities not to relax in any degree their efforts, and for appropriating bodies to maintain to the fullest possible extent their financial support.

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MENTAL HEALTH IN HARD TIMES

IN times like the present there is much talk about widespread mental and nervous disturbances, due to the stresses and strains induced by economic distress. It is natural to assume that conditions such as those created by the current depression, which is so severely taxing the adaptive capacities of a large section of the population, would tend to unbalance many of the more poorly adjusted and result in a higher frequency of mental and nervous disorders.

It is true that the depression is adversely affecting the mental and emotional lives of a great many of us and is causing all sorts of maladjustments in individual, family, and social life, especially among those whom the depression has hit the hardest—the unemployed. There is ample evidence to this effect. There is no evidence that it is greatly increasing admissions to mental hospitals, and there is little ground for alarming statements, such as have recently appeared in the press, that point to a tremendous rise in insanity, crime and suicide "all the outcome of nervous disorders induced by present-day condi-

tions." There is little in the way of first-hand information, based on impartial, objective study, to warrant such a generalization.

A preliminary inquiry by The National Committee for Mental Hygiene reveals no country-wide rise in mental disease of institutional severity, although here and there mental hospitals do report increases in admissions and readmissions. It is not likely that conditions would reflect themselves so soon in this way. Mental diseases do not occur suddenly, but develop gradually over varying periods of time, and the factors that enter into the production of mental diseases are too numerous to look for a mass increase in mental diseases from any one cause, or even one set of circumstances, like those of the present economic emergency.

As a matter of fact, we are not so sure that mental diseases have increased to any great extent, if at all, in recent years. There is a strong presumption that they have, but there is no conclusive evidence, one way or the other. The number of mental patients under care, it is true, has increased and multiplied, but authoritative opinion on the whole has referred this to the widespread increase in the provision of treatment facilities coincident with the advent of mental hygiene, not to an equivalent increase in mental disorders. More mental illness has been uncovered, thanks to the educational effects of the mental hygiene movement. The inimical effects upon mental health of the high-powered living conditions of the modern era have been assumed but not proved.

There is no recorded jump in hospital admissions consequent upon the World War, another capital crisis that might have been expected to land great numbers of us in mental institutions. Nor are there indications as yet that lead us to expect any wholesale increase in admissions to mental hospitals in the immediate or remote future as a result of the depression. Even if there should be a marked increase, it will be difficult to isolate the economic factor as a major determining cause. The problem of mental disease is too complex; there are too many unknown factors. It is said that there have been many more suicides since the depression. In this respect the findings in mental hospitals are negative.

While we may not be heading for an epidemic of mental disorders of such proportions as to swamp our hospitals with mental cases, it is evident, nevertheless, that the depression is creating serious mental problems. There is, for example, a decided increase in admissions and readmissions to institutions for the feebleminded, indicating a marked tendency to eliminate the lower grades of the mentally defective from industrial and social life. As there are institutional facili-

ties for only a fraction of the number of mental defectives in the community, enforced idleness in this group may well be complicating the problem of crime, delinquency, and dependency.

Nearly all state institutions report a reduction in their discharges and paroles, another result of unemployment conditions, which is making it difficult to return patients to the community. It is here that the depression will have one of its worst effects. Added to the chronic overcrowding of mental hospitals and the lack of adequate facilities and personnel for individualized attention, this swelling of institutional populations will make it all the more difficult to maintain standards of care and treatment above the custodial level. There is little money available for institutional expansion. Many curable cases will become incurable, due to the curtailment of treatment facilities.

Preventive work is being retarded, by the restriction of clinical and other mental hygiene activities. There is a temptation to provide only for the immediate necessities, and to cut down on provisions for active treatment and forward-looking preventive measures. The depression is accentuating problems in human adjustment which make mental hygiene work all the more necessary, yet budgets are being drastically reduced.

These problems are reacting on the younger generation in many ways. Marked changes in family life have been noted. Among the destructive effects of economic distress are, for example, those observed in children who develop extreme anxiety because of lowered morale in the home and the fear as to what may happen to that home. This, in turn, engenders hostility toward society, which is blamed for allowing such a situation to occur. The depression is undoubtedly undermining individual and family security; and a sense of security, psychological and economic, is essential to the maintenance of good mental health. The experience of our mental hygiene clinics may have something to show in this connection in the next year or two.

Child guidance workers report that offenses against property have increased during the past two years, and that conditions are favorable to a rise in the number of youthful offenders. Adolescents who in normal times would be working out their problems in healthful emancipation are now balked in making the normal adjustments, because of their difficulty in finding work, and psychologically speaking, their place in life. They are developing habits of idleness and other personality traits that augur ill for later life.

Thus we see many by-products of the depression that are aggravating the mental health problem in various ways. The mental hospital is not the only barometer of the effects of the depression on mental

health. We expect to see not so much a large increase in hospital cases of mental disease as in the incidence of the milder mental and nervous conditions, of personality disorders and maladjustments of various kinds and degrees, not only among the underprivileged but in all classes of the population.

THE SIXTY–FIRST ANNUAL MEETING

THE Sixty-first Annual Meeting of the American Public Health Association will be held in Washington, D. C., October 24–27, 1932. The headquarters will be the Hotel Willard.

The scientific excellence of Annual Meeting programs is too well known to need further comment. The annual gathering of public health workers which the American Public Health Association sponsors has achieved such a reputation that allied organizations in increasing numbers are planning meetings at the same time and place. This year we shall welcome to our sessions members of the following organizations: American Association of School Physicians, American Social Hygiene Association, International Society of Medical Health Officers, Conference of State Sanitary Engineers, Conference of State Laboratory Directors, Association of Women in Public Health, Oyster Growers and Dealers of North America, and National Shell Fisheries Association.

The American Association of School Physicians as a body will join with our Child Hygiene and Public Health Nursing Sections for one or more discussions. In order to avoid conflict with the many fine things they know by experience will be scheduled by the American Public Health Association, the School Physicians will hold their individual meetings on the Friday, Saturday, and Sunday before October 24. The Conference of State Sanitary Engineers will meet as usual on Friday, Saturday, and Monday and then merge their meeting with the Public Health Engineering Section.

The Public Health Education Section is undertaking for the first time a Health Education Institute, arranged for Saturday and Sunday, October 22 and 23. The students, limited to 25, will be drawn from the growing body of health education workers in official and nonofficial agencies. The instructors will be individuals who have had practical experience extending over many years in the creation and development of programs of health education in health departments and other health organizations. It is safe to say that such a faculty could not be assembled in any university in the United States. A short, intensive course in the philosophy and principles of health education will be

given, and students will be told how to build a program, how to set it up, and how to carry it through, with adequate instruction in the implements available for the projection of health information including the use of the spoken word, the printed word, the picture, the poster, and the motion picture.

The Industrial Hygiene Section will present an exhibit of major preoccupations of the Section. The results of experimental and research work will be shown, new methods found successful in the treatment and diagnosis of occupational diseases, and in general, progress and problems in preventive medicine in industry will be illustrated. Original work is demanded by the Scientific Exhibits Committee, and each exhibit will be in the name of the individual responsible for it.

This exhibit will be placed in one section of the Willard Room near the exhibits of services, products, and equipment, believed to be of value in health protection and promotion, which are provided by our commercial exhibitors every year. The Palm Room will also house commercial exhibits. A number of new products have been developed and marketed during the past year, which have not been called to the attention of members of the American Public Health Association up to this time. The health exhibit is always a feature of the Annual Meeting and of real service to the delegates.

Everyone knows that the ten sections of the Association hold individual meetings, and two or more combine frequently for joint meetings. Special sessions on timely subjects calculated to interest the majority of members are always arranged. The opening general session will take place on Monday evening with Dr. Dublin's Presidential address the main feature. The annual banquet will be held on Wednesday evening. A special session on mental hygiene and a presentation of the work of the ten Sections will be scheduled for two afternoons. A third session is being held open by the Program Committee to permit a discussion of topics which may be pertinent later in the year and which cannot be anticipated at this time.

The Section programs, still incomplete, show many interesting things. The Committee on Training and Personnel will sponsor a luncheon meeting at which the training of engineers, nurses, and health officers will be discussed. Diphtheria will be the topic at another luncheon meeting. Several sections are developing symposiums. There will be one on air hygiene; one on incidence, identification, and significance of bacterial carriers; one on Standard Methods; one on bacterial dissociation; one on vital statistics registration problems; and one on participation of the medical profession in health education.

The Washington Local Committee, under the able direction of Dr.

William C. Fowler, Chairman, is arranging a program of inspection trips in and around Washington, and of entertainment in which every delegate will be interested. A minimum amount of recreation is essential during a scientific meeting extending through four days, and the value of social contacts made at such times should not be overlooked.

Members of the Association will travel to and from Washington at the convention rate of three-quarters of the round trip fare granted by the railroads. Lower-than-usual rates for hotel accommodations have been secured for members by the Association. Attendance at the Sixty-first Annual Meeting need not be expensive. Perhaps more than at any time in recent years is an expenditure for travel to the Annual Meeting justified. Health workers who are fighting reduced appropriations in the face of increasing responsibilities will have their courage restored through the awareness of their numbers, their strength, and their influence that gathering together in Washington will impart.

Arlington Bridge and Lincoln Memorial
Washington, D. C.

ASSOCIATION NEWS

Sixty-first Annual Meeting of the A. P. H. A.
Washington, D. C., October 24–27, 1932
Headquarters, Willard Hotel

NEW MEMBERS

The following list includes applicants who have been approved for membership in the A. P. H. A. by the Sub-committee on Eligibility. These new members have requested affiliation with the sections indicated, and action by the Section Council will follow.

Health Officers Section

Pedro Rivera Aponte, M.D., Public Health Unit, Cayay, P. R., Health Officer

Dr. Manuel B. Berrios, M.D., P. O. Box 92, Yabucoa, P. R., Health Officer, Public Health Unit

Francisco J. Casalduc, P. O. Box 935, Mayaguez, P. R., Director, Public Health Unit

George E. Clarke, M.D., Oakland, Md., Deputy State Health Officer

John R. Downes, M.D., Newark, Del., Deputy State Health Officer

Dr. Percival E. Faed, Gainesboro, Tenn., Officer in charge Trachoma Control Activities

Mario McC. Fischer, M.D., Health Dept., Duluth, Minn., Director of Public Health

Carl M. Gambill, M.D., Salyersville, Ky., Health Officer, Magoffin County

Andres Montalvo Guenard, M.D., Public Health Unit, Bayamon, P. R., Health Officer

Guy G. Lunsford, M.D., Millen, Ga., Commissioner of Health, Jenkins County

George F. Reeves, M.D., Nashoba Assoc. Boards of Health, Ayer, Mass., Health Officer

Juan del Rio, M.D., Loiza, P. R., Chief, Public Health Unit

Julio A. Santos, M.D., Box 746, Arecibo, P. R., Director, Public Health Unit

Rafael Ramirez Santos, M.D., Salinas, P. R., Health Officer

Raymond E. Smith, 518 S. Dickel St., Anaheim, Cal., Food and Sanitary Inspector

Rafael S. Vazquez, M.D., Manati, P. R., Chief, Public Health Unit

Charles G. Wharton, M.D., 116 Temple St., Los Angeles, Calif., Asst. City Health Officer

Cas. P. Wilson, M.D., Sevierville, Tenn., Box 54, Health Officer

Laboratory Section

Vivian R. Lederer, Pomona Health Center, Pomona, Calif., Bacteriologist

Rocco Leone, Waltham Inn, Waltham, Mass., Laboratory Technician

Paul S. Nice, 312 17 St., Denver, Colo., Consulting Bacteriologist

Nelly K. Whitfield, Box 18, Dotham, Ala., Director, Dotham Branch of State Laboratory

Public Health Engineering Section

General T. Prater, Cleveland, Tenn., Sanitary Officer

Industrial Hygiene Section

Thomas M. Carey, 622 Jefferson Ave., Defiance, O., Ventilation Engineer

Daniel H. Goodnow, Jr., 6 Jackson Road, W. Medford, Mass., Student (Assoc.)

Food and Nutrition Section

Donald H. Cook, Ph.D., School of Tropical Medicine, San Juan, P. R., Associate Professor of Chemistry and Nutrition

Luis G. Hernandez, School of Tropical Medicine, San Juan, P. R., Instructor in Chemistry

J. Edward Kimlel, 502 U. S. Custom House, Denver, Colo., Charge Food and Drug Admr., Lab.

John S. Koen, Rm. 64, Municipal Courts Bldg., St. Louis, Mo., Chief Meat Inspector

G. Edward Pendray, 450 W. 22 St., New York, N. Y., Editorial Dir., Milk Research Council (Assoc.)

Rafael del Valle Sarraga, P. O. Box 935, San Juan, P. R., Director, Chemical Laboratory

Public Health Education Section

Arthur H. Bryan, V.M.D., 4400 Raspe Ave., Baltimore, Md., Assistant Professor of Bacteriology, University of Maryland

Clough T. Burnett, M.D., 550 Metropolitan Bldg., Denver, Colo., Associate Professor of Medicine, University of Colorado

Caldwell Martin, 704 Symes Bldg., Denver, Colo., Member Executive Comm., Denver Community Chest (Assoc.)

Cornelia Mooter, 4809 Baring Ave., E. Chicago, Ind., Teacher, Physical Education, McKinley School

William H. Perkins, M.D., 1430 Tulane Ave., New Orleans, La., Professor and Director Dept. of Preventive Medicine

Ruth E. Whitney, Dept. of Public Health, Yale School of Medicine, New Haven, Conn., Assistant

Public Health Nursing Section

Douschka M. Alford, Elizabethton, Tenn., County Public Health Nurse

Marion G. Crowe, 303 Fitzpatrick Bldg., Portland, Ore., Supt., Visiting Nurse Assn.

Mary C. Ferguson, R.N., Liverpool, N. S., Victorian Order Nurse

Margaret Leddy, R.N., 3312 Federal St., Camden, N. J., Local Supervisor, Metropolitan Life Insurance Co.

Helen J. Marble, 204 High St., Pawtucket, R. I., Director of Nurses, Central Falls Chapter, A. R. C.

Cecilia M. Mink, R.N., 541 Washington St., Allentown, Pa. (Assoc.)

Essie M. Sanborn, County Health Dept., Trenton, Tenn., Public Health Nurse

Margaret Stiles, R.N., Box 54, Sevierville, Tenn., Public Health Nurse

Unaffiliated

Lester L. Griffith, Box 54, Sevierville, Tenn., Sanitary Inspector

George B. Holmes, Dresden, Tenn., Sanitary Inspector, Weakley County Health Dept.

DECEASED MEMBERS

George Eastman, Rochester, N. Y., Elected Honorary Fellow 1915

Carl C. Gibbs, Lake Forest, Ill., Elected Member 1928

Herman O. Hodson, Hillsboro, O., Elected Member 1930

E. Franc Morrill, M.D., Rock Island, Ill., Elected Member 1930

D. Palmer Smagg, M.D., Stottville, N. Y., Elected Member 1926

PUBLIC HEALTH ADMINISTRATION

ANNUAL REPORTS

JOHN P. KOEHLER, M. D., F. A. P. H. A.

Health Commissioner, Milwaukee, Wis.

ONE of the most annoying problems that every health officer has to face annually is the compiling of an annual report. It is an accepted fact that every well managed organization makes an annual report to its members or stock holders. A health department can be no exception, if it wishes to maintain the confidence and coöperation of its supporters.

The compiling of annual health department reports is becoming more and more of an onerous duty for the health officer, instead of a much desired opportunity. This is due to several reasons. While a great deal of emphasis is laid upon annual reports by health authorities, the importance of such reports is not always appreciated by those responsible for the health department's budget. The question, therefore, arises, how can a health officer issue a report which is a credit to his department without having any or adequate funds set up for such a purpose?

Not only does a health officer have to worry about the cost of his annual report, but also about its contents. If he makes a long detailed report, he is told that no one will take the time to look it over, and if he condenses his report too much, he is in danger of omitting information desired by other health departments and also necessary in his own office for future reference. Since 1921, the Milwaukee Health Deartment was not given any funds for the printing of an annual report. A condensed report of the Health Department activities has been included in the annual report of all city activities by the Municipal Reference Library. This has been the only report available to the general public. For its own files and for the Mayor, the Common Council, and the Municipal Reference Library, the Health Department prepared four complete typewritten reports. This arrangement has not proved entirely satisfactory because the condensed report of the Library did not contain sufficient information for people especially interested in health work, and the typewritten reports were not available for public distribution.

It is for this reason that it was possible to persuade the Municipal Reference Library to give the Health Department more space in its annual report for 1931. Since it was considered extravagant to mail complete reports of all city activities to people who were only interested in the Health Department's work, it was decided to have reprints made of the Health Department's report. The Library paid for the reprints of a 40-page report at a cost of 5 cents each. The Health Department paid for 3 extra pages and a cover for the reprint at 7 cents each. This arrangement made it possible for the Health Department to have 400 copies of a printed report for general distribution at a cost of $28.00, which could easily be spared from its general publication fund.

It has also been found advisable to make some changes on the typewritten report kept in the department for a

permanent record. In the past, we have depended a great deal upon our letter files for the keeping of valuable information. We have learned from experience, however, that it is very difficult to get information out of a letter file concerning events that occurred many years ago. It is for this reason that, beginning with the report of 1931, the typewritten report will not only contain a detailed account of the various activities of each division of the Health Department, but also an appendix containing all information which might be of value in future years.

Such an appendix might contain not only all ordinances passed, but also ordinances defeated, with the reasons for their defeat. All special surveys and reports which might be too cumbersome to insert in the regular report can be included in such an addition. Many discussions on controversial subjects occurring during the year might be entered in such a report and yet be out of place in a report leaving the Health Department. Copies of very important letters and other documents can be entered in such an appendix. At the present time it is almost impossible to obtain much detailed information on events that occurred 10, 15, or 20 years ago, because reports compiled and printed for the use of the general public can obviously not contain all of the information desired from time to time by the Health Officer and his associates.

Necessity has been the mother of invention in the Milwaukee Health Department. Where it was unable to have one report printed due to lack of funds, it is now preparing three reports; one condensed, printed report for general distribution, three complete typewritten reports for the Mayor, the Common Council, and the Municipal Reference Library, and one detailed typewritten report with supplementary material for the files of the Health Department.

In addition to these three reports, the Health Department issues a statistical report for other health departments, and prints a summary of its annual report in 9,000 copies of its monthly bulletin.

Decatur, Ill.—With an estimated population for 1931 of 58,600, there were 1,133 births in Decatur, a rate of 19.3; 738 deaths, giving a rate of 12.6.

Especially noteworthy was the fact that there were no maternal deaths, which is an unusual record for a community of any size. Among the more important causes of death were heart disease, cancer, pneumonia, and apoplexy. Tuberculosis has been relegated to 7th place on the list and, with 21 deaths, was only slightly above suicide with 19 deaths. The infant mortality rate was 47.6. The Health Commissioner is to be congratulated upon a very readable type of report, illustrated with simple pictures. The material is presented in such manner as to be very useful in the Interchamber Health Conservation Contest.—*Annual Report*, City of Decatur, Ill., 1931.

Framingham, Mass.—This city had the lowest death rate of its history, 9.9 per 1,000, in 1931, and a new low figure for tuberculosis of 22.5 was established. With a population of 22,222, there was expended for public health work the sum of $24,686.33 or $1.11 per capita. —*Annual Report*, City of Framingham, Mass., 1931.

Evanston, Ill.—The net death rate figure, excluding non-residents and after correcting for the deaths of citizens of Evanston in Chicago, was 8.02, a slight decrease over 1931. Among the principal causes of death were: heart disease, cancer, cerebral hemorrhage, pneumonia, and tuberculosis. The infant mortality was 39.2, an advance over the rate of 33.8 for 1930. There were 4 more cases of diphtheria than in the preceding year, and 8 more carriers

were found. However, 9 cases including 1 carrier and 1 death occurred in a single house into which a family from the country had moved but a short time before the outbreak. All told, there were only 19 cases of diphtheria, 7 of which were in the preschool group.—*Annual Report,* City of Evanston, Ill., 1931.

Salem, Mass.—The death rate of 13.1 was slightly higher than that of the preceding year as was the infant mortality rate. There has been a noticeable decrease in diphtheria cases and deaths. With a population of 43,353, there were reported only 14 cases of pulmonary tuberculosis and 9 cases of other forms of tuberculosis. There were 10 cases of infantile paralysis, of which 2 were fatal.—*Annual Report,* City of Salem, Mass., 1931.

Child Hygiene in Pennsylvania—With the coöperation of the Department of Public Instruction, all new school building projects were referred to the School Division of the State Department of Health for investigation of the water supply and the proposed method of sewage disposal. A total of 555 investigations were made and finally approved as a result. Improvement of sanitary conditions in school buildings throughout the state was secured by personal conferences with the school boards and county superintendents of schools. Among other results, there were 228 school buildings equipped with flush toilets.

Two motor units spent 3 summer months as usual in rural districts. Each car operated with a staff of 2 doctors, 2 dental hygienists, and 2 or more nurses. The cars the past year for the first time were driven by medical students. A special feature of the summer was the attention given to vision testing of children of 4 years of age and over. The 2 medical students were instructed in vision testing by the Director of Sight Conservation of the State Council for the Blind, and under her guidance each student was given experience preparatory to the motor unit work. There were 378 cases found of children having eye defects, and extra follow-up care was necessary in order to insure against further sight damage. In the areas visited, local committees were formed if there were not already Parent-Teacher Associations or other organizations to coöperate in the child hygiene work carried on by the motor units. All cases found with defects were referred to the family physicians, and home visits were made by nurses or lay committee members to aid in stimulating parents to secure necessary professional attention.—*Yearbook,* Pennsylvania Dept. of Health, 1930.

Cattaraugus County (N. Y.) Developments—The 9th year of the county health unit plan of Cattaraugus County is marked by the taking over of the routine services by public authorities, the beginning of a series of investigative projects, supported by the Milbank Memorial Fund, and progress in integration of health and welfare authorities, particularly enhanced by the gift of the Bartlett Community Center in Olean, in which are now located the offices of most of the health and welfare agencies of the county.

The budget for 1931 totalled $87,000, half of which came from the county, and a like amount from state funds. The department has taken over responsibility for health in the Allegany Indian Reservation, hitherto covered by one nurse under the District State Health Officer. In addition, the county health officer serves as health officer to Allegany State Park, this arrangement having been approved by the State Park Commission and the Cattaraugus County Board of Health.

The birth rate seems practically

stationary, being 20.2 for 1931, as contrasted with 20.4, the average for the 10 years. The infant mortality rate for 1931 was 64, with a 10-year average of 72. The diphtheria situation has merited special attention. Fourteen of the 26 cases occurred in one town where 64 per cent of the preschool children are immunized. This suggests increased virulence of the diphtheria organism, and is considered a warning to other communities that diphtheria is still a dangerous disease. The tuberculosis death rate for the county for the past 10 years shows a remarkable decrease, from 68.3 in 1923 to 41.4 in 1930, and a new low level of 30.8 in 1931, 28 per cent less than the 5-year average. Evidence in the county points toward a low rate of infection under 20 years of age, and the bureau looks forward to establishing tuberculin testing and X-raying in the larger schools as its next step forward.

The nursing program aims to give the best possible service for the amount of money appropriated. Although the staff is large in comparison with that in many rural areas, it is about half the size actually desirable. The withdrawal of the state nurse from the Indian Reservation has added considerably to the existing case load of each nurse. This year for the first time a student program has been attempted.

Classes in home nursing, child care, and first aid, taught by nurses in 1931, reached 236 persons. In rural communities this aspect of the work is important. School work is shown to have occupied 11 per cent of the nurses' time and is on the increase. It is felt to be time well spent, and Cattaraugus County schools far exceed *Appraisal Form* standards in correction of defects. In the fall of 1931, a new school program was inaugurated with the following objectives: (1) Higher percentage of correction of defects; (2) more parents present at school physical examinations; (3) better building inspection; (4) a more uniform health education program; and (5) improved record systems for teacher and nurse. All of these aims have been partially realized.

Since specialized supervision has been discontinued, staff education is being carried on by means of the available services of the State Department in the form of group conferences, institutes, and extension conferences.

The year 1931 represents the 3d year of operation of a sanitation bureau under the full-time supervision of a sanitary engineer. The report reviews the variety of service given and shows a demand for supervision of private water supplies, drainage problems, building sanitation, public water supplies, milk control, sewage disposal, and the like. A demand for sanitary sewage disposal systems for rural schools is noted.—*Cattaraugus County Dept. of Health Report*, 1931.

Orange County, Calif.—A full-time health unit was initiated in Orange County in 1923. Its jurisdiction was at first limited to the unincorporated area, but gradually service has been extended to towns and cities. A population of approximately 120,000 is now served. Newport Beach is the only city having its own health department.

School health work, with the exception of communicable disease control, is in some districts under the direction of the Board of Education. In others, it is under the direct supervision of the Health Department, but reimbursement is made by the Board of Education on the basis of service rendered. In the examination of 12,485 children, a total of 6,444 physical defects were found, and of these, 1,684 were corrected during the year.

Thirty-three child welfare clinics were held every month in various parts of the county. A registration of 7,046 infants and preschool children represents

an increase of 2,474 over 1930. No prenatal clinics are held. Expectant mothers coming to the attention of the health department are referred to the County hospital for this service.—*Annual Report,* Orange County Health Dept., Calif., 1931.

Tuberculosis Mortality Among Young Women—A very careful sociological study of the 180 deaths from tuberculosis among young girls from 15 to 25 years of age which occurred in Detroit in 1930 has been made. That the tuberculosis death rate among adolescent girls has been declining at a less rapid rate than has occurred for other age and sex groups is well known to all students of the subject.

The author concludes that up to the age of 18, no marked disparity was evident between the male and female tuberculosis rates. She recognizes that the problem of tuberculosis among the negro population is serious and appears to be accentuated among young females. The author further concludes that the income of the family had no particular influence upon the tuberculosis mortality, nor did the housing conditions under which these individuals lived.

Deaths were not concentrated among uneducated girls but occurred in a group which slightly exceeded the normal educational level. Employment of girls exerts little if any influence. There is no indication that the wearing of insufficient clothing was a contributory factor. The emotional tension and the ambition for popularity reflected in the forms of recreation enjoyed, together with insufficient rest, probably combined to predispose to tuberculosis in a considerable number of cases.

There was evidence of a distinct tendency toward marriage and childbearing at an early age. Pregnancy during the age period before 20 was common and closely linked up with the onset of disease. Undoubtedly this constituted the most important single causative factor in the mortality of this group.—Edna E. Nicholson, *A Study of Tuberculosis Mortality Among Young Women,* Social Research Series No. 1, National Tuberculosis Assn.

New York State—"Public health should be the State's paramount interest and the success or failure of any government must be measured by the well-being of its citizens," declared Governor Franklin D. Roosevelt, in commenting upon the final report of the Governor's Special Health Commission, entitled "Public Health in New York State," recently made public. After nearly 2 years of study, the commission, of which President Livingston Farrand of Cornell University is chairman, and State Health Commissioner Thomas Parran, Jr., is secretary, has submitted the final report.

Hailed by authorities as the most adequate survey ever made of the public health resources of the state and the most comprehensive state program for individual and community health action ever formulated, the report should attract wide interest among public authorities and community leaders throughout the United States. The new health program recommended by the commission sets up guideposts for long-range planning and action in public health for the next decade or two. Special attention is called to the unnecessary cost of preventable sickness and the savings in community expenditures for community relief which are possible by the application of modern methods of disease prevention. The report recommends that the present system of local health service be reorganized by substituting the county for the town and village as the local unit, with the appointment of a county board of health and health commissioner in all counties.

"Only half of the chapter on tu-

berculosis has been written," said the Governor. "During the past 25 years tuberculosis has been dislodged from 1st to 6th place as a cause of death, and its rate cut in half. Its rate may again be cut in half and the reduction in present expenditures for caring for the victims of this disease will pay the cost of the new health program." It is recommended that the three state tuberculosis sanatoriums which have been authorized be constructed and put in operation with the least possible delay. A more comprehensive tuberculosis control program is outlined.

The commission points out that of the 5,606 infants under 1 year of age who died in New York State in 1930, more than one-half would still be living if every community utilized the simple, well known measures which over and over again have proved effective in saving the lives of babies. Other than the indifference of local governments, there is no reason why twice as many babies should die each year in some counties and cities as in other communities where a modern health program is in force, or for tuberculosis to be twice as prevalent in some counties of New York State as in others. Deaths and illness from diphtheria continue to occur, whereas some municipalities have been able to stamp it out entirely. Among the important recommendations dealing with maternal and infant hygiene, it is suggested that the State Department of Health appoint a Maternity Commission to advise in respect to its maternity program, to revise and apply present standards of maternity care, to appraise the findings of case investigations, and to point out the methods of preventing maternal deaths.

The need for prompt and competent treatment of venereal diseases is stressed. The commission presents evidence that these diseases are among the most serious of our public health problems and that their control is possible by methods similar to those which have proved effective against other communicable diseases. The commission believes that the next great public health achievement can be the suppression of syphilis.

There is urged encouragement of epidemiological measures for the control of venereal diseases on a state-wide basis in coöperation with the medical profession.

Under public health nursing, it is recommended that as county health departments are developed throughout the state, each with an adequate staff of public health nurses, a qualified supervising nurse be placed in each unit under the direction of the county health commissioner, who shall: (*a*) be responsible for the work of staff nurses; (*b*) serve in an advisory capacity to and coördinate the work of all public health nurses in the county.

The commission report calls attention to the importance of public health education and recommends that the educational functions of the State Department of Health be reorganized for greater efficiency in interpreting the activities of the department and for greater service to the people; that necessary appropriations be secured for additional trained personnel and requisite facilities. It is suggested that the department assume responsibility for leadership in developing and establishing adequate courses in qualified schools and colleges of the state to familiarize students of medicine, dentistry, nursing, and teaching with the basic principles of public health. There is also recommended an inter-departmental committee to function in all matters having to do with health education in which more than one department of state government is concerned.—*Public Health in New York State*, Dept. of Health, Albany, 1932.

LABORATORY

DIPHTHERIA TOXOID PRECIPITATED WITH ALUM

Its Preparation and Advantages

DEWEY M. WELLS, ARTHUR H. GRAHAM, M. D.,
AND LEON C. HAVENS, M. D., F. A. P. H. A.

Alabama State Board of Health, Montgomery, Ala.

GLENNY and Barr[1] have recently described the complete precipitation of diphtheria toxoid with alum. This procedure differs from previous alum treatment[2,3] in that the toxoid is completely precipitated by the use of larger amounts of alum (2–10 per cent), the precipitate is separated from the supernatant by filtration and is then resuspended in physiologic salt solution. They showed that the loss of specific antigen in the precipitate was less than 20 per cent while the decrease in nonspecific nitrogen, as shown by tests of the supernatant broth, was as high as 70 per cent. Evidence has already accumulated that the antigenic value of toxoid is improved by the addition of alum. Glenny[3] has used it in the immunization of horses and Park and Schroder[4] have used a toxoid containing only 0.2 per cent alum and obtained results in guinea pigs and children which were superior to those with ordinary toxoid.

PREPARATION OF THE PRECIPITATED TOXOID

The toxoid precipitate used in the experimental work was prepared as follows: to 1 liter of lot 59, which contained 20 antigenic units per c.c., as determined by flocculation with antitoxin, was added 500 c.c. of a sterilized 4 per cent solution of aluminum-potassium sulphate. A coarse, flocculent precipitate formed at once which settled out in about 4 hours. The supernatant fluid was siphoned off aseptically and the precipitate was made up to 1 liter with 0.85 per cent NaCl solution. After storage at 4° C. overnight the supernatant liquid was again siphoned off, and 0.85 per cent NaCl added to make the original volume of 1 liter. Biuret tests on the first supernatant indicated that about 70 per cent of the protein of the original toxoid remained unprecipitated.

Contrary to the observations of Glenny and Barr[1] we have encountered considerable difficulty in determining flocculation values with the alum precipitates dissolved in Rochelle salt (sodium potassium tartrate). Furthermore, as they have stated, different lots of broth require somewhat different treatment. We have, however, obtained results with 3 lots of toxoid which seem to be specific and which indicate that 75–80 per cent of the specific antigen is contained in the precipitate and that 50–70 per cent of the protein content of the whole toxoid is left in the filtrate.

In Table I are summarized the results of immunity tests in guinea pigs following a single injection of varying amounts of the alum toxoid. It is seen that not only did as small an amount as 0.1 c.c. cause the production in 4 weeks time of sufficient antitoxin to resist an injection of 5 m.l.d. of toxin, but that an injection of 0.5 c.c. uniformly protected pigs against large amounts of toxin, even as much as 100 m.l.d. In every instance the injections of toxin

were made 4 weeks after the injection of toxoid.

A single injection of the alum precipitate in guinea pigs produced such a high degree of immunity that our observations were extended to the effect of a single injection in children. If a considerable percentage of children could be made Schick-negative by a single injection, mass immunization could be greatly accelerated. A group of 98 children was selected on the basis of strongly positive Schick tests, and these were given a single subcutaneous injection of 1 c.c. of the washed precipitate. The Schick test, made 8 weeks after the injection, was negative in all but 6. There was a complete absence of severe reactions in this group, a further indication that the product was in a purer state.

There are several technical points in connection with the practical procedures still to be determined. As Glenny and Barr have shown, the optimum concentration of alum necessary to produce complete precipitation with a minimum amount of extraneous protein varies with different kinds of broth, and we have some evidence that it may vary with different lots of toxoid made with the same broth formula. We have thus far obtained fairly uniform results by preliminary titrations to determine the optimum amount of alum. The length of time required for precipitation to take place probably varies with different lots. Since the desired result is to obtain the maximum yield of specific antigen in the precipitate in as pure a state as is practically possible, the time should neither be too much shortened nor too greatly prolonged. We have confirmed Glenny's finding that the average time is about 2–4 hours; if the alum is permitted to act much longer than this the protein content of the precipitate increases without a corresponding increase in the yield of toxoid.

The advantages of the alum treated toxoid are obvious. The complete precipitation of the toxoid with re-suspension in salt solution results in a purified product, as evidenced by the amount of nonspecific protein discarded in the filtrate. The precipitation permits the use of low-grade toxin for the manufacture of toxoid, since the finished product can be concentrated to any desired extent by decreasing the volume of salt solution in which the precipitate is suspended. The chief advantage, however, is the production of immunity in over 90 per cent of children by a single injection. If further observations confirm these results, diphtheria immunization can be greatly accelerated.

TABLE I

IMMUNIZING ACTION OF ALUM TOXOID IN GUINEA PIGS

Toxoid Lot No.	Amount Toxoid Injected c.c.	M. L. D. Toxin	No. Pigs Tested	No. Pigs Surviving	No. Died Diphtheria Intoxication	Remarks
54	0.5	10	2	2	0	
54	0.1	5	2	2	0	
59	0.5	5	8	6	0	2 died of pneumonia
59	0.5	10	5	5	0	
59	0.5	20	5	4	0	1 died of pneumonia
59	0.5	50	5	5	0	
59	0.5	75	5	5	0	
59	0.5	100	10	10	0	

SUMMARY

Complete precipitation of toxoid with aluminum-potassium sulphate results in a purified product. More than 50 per cent of the original protein remains in

the filtrate. A weak toxoid may by this procedure be concentrated to any desired degree.

The alum precipitate has a high antigenic value. A single injection of 0.5 c.c. in guinea pigs protects against 50–100 m.l.d. of toxin injected 4 weeks later.

A single injection of 1 c.c. in 98 Schick-positive children resulted in a negative test 8 weeks later in 92, 94 per cent.

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VITAL STATISTICS

BIRTH AND DEATH CERTIFICATES AS PUBLIC RECORDS

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AN inquiry addressed to the registration officials of all states (and to the District of Columbia) brought out a striking divergence in the practice of furnishing transcripts of birth and death certificates. A summary of the replies follows:

PROCEDURES GOVERNING THE ISSUANCE OF TRANSCRIPTS OF BIRTH AND DEATH CERTIFICATES IN CONTINENTAL UNITED STATES

(Information furnished by State Departments)

(1) *Records considered confidential under direct provisions in the law:*

(a) *All records*

Alabama—Applicant for certified copy must be "entitled to same."

Kentucky—According to law, "the confidential relation existing between a physician and his patients is extended to the birth certificates." (Quoted from letter.)

Maryland—Certified copies may be furnished any applicant "for proper purposes." The law of the State of Maryland also provides that "any county registrar, local registrar, deputy local registrar, or state registrar, who shall communicate to any person not authorized to receive the same any of the personal or statistical facts recorded on his register, shall be deemed guilty of misdemeanor and on conviction thereof, shall be fined not exceeding $300." Annotated Code, 1924, Section 28.

Nebraska—Certified copies may be furnished to any applicant "for any proper purpose."

New Mexico—The law gives power to State Board of Public Welfare to promulgate regulations to prevent "wrongful or improper use of the information contained" in certificates of births, deaths, and marriages.

New York—Certified copies must be supplied to any applicant unless the state commissioner of health "is satisfied that the same does not appear to be necessary or required for judicial or other proper purposes."

Texas—The law provides that certified copies shall be supplied upon request to "any properly qualified applicant." An amendment to the law forbids the issuance of "a certified copy of any birth or death certificate wherein a child or an adult is stated to be illegitimate unless such copy is ordered by a court of competent jurisdiction."

(b) *Only records of births or deaths of illegitimate children*

Minnesota
Virginia
West Virginia

(c) *Only original records that have been corrected*

Massachusetts—All records are open to public inspection "excepting in cases of original records that have been corrected; the corrected records are open to public inspection, but the original records that have been corrected are open only to inspection by the persons concerned or such officials whose duties would require that they may be inspected." (Quoted from letter.)

(2) *Records considered confidential under regulations of the Department of Health or an opinion of the State Attorney-General; no direct provision of the law:*

(a) *All records*

Florida	No. Carolina	Tennessee
Idaho	Ohio	Wisconsin
Iowa	Oregon	Wyoming
Louisiana	Pennsylvania	

(b) *Only records of illegitimate births*

Arkansas
North Dakota
Utah

(c) *Only birth certificates*

District of Columbia

(3) *No legal provision or state regulation. A number of replies stated that the requirement of a fee for a search or transcript acts as a deterrent in many instances where the motive of the applicant is mere curiosity:*

Arizona	Kansas	New Jersey
California *	Maine	Oklahoma
Colorado	Michigan	Rhode Island
Connecticut	Mississippi	So. Carolina
Delaware	Missouri	So. Dakota
Georgia	Montana	Vermont
Illinois	Nevada	Washington
Indiana	N. Hampshire	

* The regulations of the department of health provide that a search must be "a proper one (in not being merely to gratify idle curiosity or for some scandalous object, or for a purpose in which the inquirer is not beneficially interested)." No reference is made to any restrictions upon the issuance of transcripts when the required fee is paid.

In only 7 states are the records of births and deaths shielded by law against indiscriminate inspection; it is interesting to add that in one of them, Maryland, the communication of any personal or statistical facts contained in the certificates "to any person not authorized to receive the same" is a misdemeanor and, on conviction, the registrar is subject to a fine not exceeding $300. In 11 states the records are considered confidential on the basis of departmental regulations or opinions of attorneys general. In 7 states and the District of Columbia specified types of records, mainly those of illegitimate children, are protected either by law or regulation. In the remaining 23 states, no restrictions are imposed upon the issuance of transcripts other than the payment of legal fees and the convenience and dispatch of public business.

In an opinion, later upheld by the Court of Appeals, the Appellate Division of the New York Supreme Court stated that,

> Publicity statutes . . . are common in this country, and they are usually couched in broad terms, but it is generally held that even under such statutes, the individual seeking an inspection must show that the information is sought for some legitimate and specific purpose, and that the gratification of mere curiosity or some speculative purpose will not suffice. What will be deemed a sufficient reason for the examination of any specified records must depend in each case upon its own peculiar circumstances. The department of health . . . differs in many respects from other municipal departments. In consequence of the nature of its duties it becomes the repository of the records concerning the most intimate affairs of the individuals resident within the limits of the municipality, and among these records are doubtless to be found many matters of no public interest, but which might, if disclosed to whomsoever sought to examine them, be used for sinister or unworthy motives. (Matter of Allen, 205 N. Y. 158.)

Certain items on birth and death certificates may be looked upon as being of legitimate public interest: the fact of a birth, the sex of the child, the name of the parents; similarly, the fact of a death, the name, age, and sex of the deceased. Other items, however, do not belong in the same category. The public good, clearly, does not require that an inquisitive person be told the age of her neighbor, or given information re-

garding a birth to an unmarried woman, or furnished with any of the facts contained in the medical part of a death certificate in violation of the accepted practice of all civilized countries which protects the knowledge gained by a physician in the course of his professional duties. In the words of the Court of Appeals of the State of New York:

> The disclosure by a physician, whether voluntary or involuntary, of the secrets acquired by him while attending upon a patient in his professional capacity *naturally shocks our sense of decency and propriety* and this is one reason why the law forbids it. The form in which the statements are sought to be introduced is of no consequence, whether as a witness on the stand or through the medium of an affidavit or certificate. Davis vs. Supreme Lodge, Knights of Honor (165 N. Y. 159).

For many years, committees of the American Public Health Association, in coöperation with other organizations, have labored over the essential problem of improving the accuracy of certified causes of death. Finally in January, 1932, in another important decision, the same view was emphatically reiterated by the Appellate Division of the New York Supreme Court: *

> The reason assigned for the necessity of such disclosure of official documents of the department of health does not outweigh the importance of keeping the contents of such papers secret.
>
> To divulge to the world the secrets of a patient would not only be shocking, but against public policy.

A uniform classification of causes of death and treatment of joint causes is, of course, essential, but it must be based on the premise that the statement on a death certificate represents the true judgment of the certifying physician. When this judgment is confided to the care of a registration office, is there not an implied pledge that the physician's statement will be safeguarded and the information used only for statistical record and scientific research?

The accuracy of our natality and mortality statistics is directly related to the accuracy of the information contained in the birth and death certificates and this can be achieved in full measure only through the general acceptance of the principle that facts which relate to " the most intimate affairs of individuals " must be treated confidentially.

Twenty-Five Years of Public Health in Pennsylvania, 1906–1930 —Vital statistics records for the Commonwealth of Pennsylvania cover the years since 1906 when state-wide registration was begun. These reports indicate that considerable progress has been made in many endeavors of public health workers. Just what has been accomplished can be illustrated best by the birth and death figures for this period.

In 1906, there were 167,265 children born in the state. In 1930, the number was 189,573. Although this indicates an actual gain, the rates show a constant decline. The 1906 birth rate per 1,000 population was 23.4. The peak was reached in 1914 (27.0) and a gradual decrease since that time has brought the rate for 1930 down to 19.6. This diminution is not confined alone to Pennsylvania, for the entire United States Registration Area is experiencing a similar loss. Stillbirths, which are considered separately from both natality and mortality statistics, have diminished correspondingly. Twenty-five years ago there were 8,679 stillbirths with a rate of 51.8 per 1,000 live births, and in 1930 the total was 7,957, giving a rate of 42.0.

It is interesting to note the change in the ranking of the leading causes of death during this interval. Tuberculosis (all forms) held first place in 1906.

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* Health Department's Records Confidential, *Week. Bull.* New York City Dept. of Health, Feb. 6, 1932.

By 1910, it had dropped to 3d and 1925 found it in 6th place, the position it maintained in 1930. Heart disease gained the lead in 1915 where it has remained with a few exceptions. Nephritis, cerebral hemorrhage, pneumonia, diseases of early infancy and cancer, although varying in order, have been among the 7 most important causes of death during the entire 25-year period.

With the exception of 1918 when the severe influenza epidemic resulted in an unusually high toll, the general death rate has declined steadily from 16.0 per 1,000 population in 1906 to a preliminary rate of 11.6 for 1930. By the use of antitoxin, toxin-antitoxin and the more recently developed toxoid, the diphtheria mortality has been lowered from 34.1 per 100,000 population (1906) to 5.2 (1930). Due to the frequency of smallpox vaccination, deaths from smallpox are rare—only 1 since 1925. Because of strict vigilance over quarantine and the widespread education of the people concerning communicable diseases, the losses from measles, scarlet fever, and whooping cough have decreased. Since the sources of milk and water supplies have been carefully supervised and inspected, the disorders which are spread by such carriers have been restricted. Typhoid fever has been reduced from 54.8 per 100,000 population in 1906 to 2.6 in 1930. Diarrhea and enteritis under age 2 has also fallen from 137.2 to 23.3 per 100,000 population.

Infant mortality rates show a great reduction. In the first year of statewide registration, 27,908 children under 1 year of age died, as compared with 12,887 in 1930. The contrast between the rate of 167 per 1,000 live births for the former year and 68 for the latter shows more clearly the true gain.

Great progress has been made in the control of the respiratory diseases, most important of which is pulmonary tuberculosis. From this cause, there were 9,258 deaths with a rate of 129.6 per 100,000 population in 1906, which by 1930 had been reduced to 5,295 with a rate of 54.0. Pneumonia (all forms) and bronchitis have responded also to the attacks made against them. On the other hand, the trend of influenza has been slightly upward. Safety propaganda, together with the development and use of safety devices, has been responsible for the decreasing rate for accidental deaths. This is due in large part to the reduction in mine and quarry disasters. The highest rate recorded for deaths from accidents in this class was 21.2 per 100,000 population in 1907; the lowest, 8.2 in 1930. The rate for fatal railroad injuries has dropped from 30.2 in 1906 to 5.4 in 1930. The death rate from automobile accidents, however, is an increasingly important factor in the general mortality. In 1906, there were 19 persons killed in automobile accidents, with a rate of 0.3 per 100,000 population. Since that time, because of better roads and cheapness in production, motor vehicles have become more numerous and incidentally more dangerous, so much so that in 1930, 2,424 persons in Pennsylvania lost their lives as a result of automobile accidents, bringing the death rate from this cause up to 25.1.

The degenerative diseases have been climbing upward steadily. Heart disease, the leading cause of death, has increased from 133.5 per 100,000 population in 1906 to 239.1 in 1930. During the same period, cerebral hemorrhage has risen from 73.1 to 85.5; cancer from 58.9 to 100.0; nephritis from 84.3 to 104.3; diseases of the circulatory system (exclusive of heart disease) from 16.2 to 30.3; and diabetes from 10.5 to 22.4. Maternal mortality has maintained an even trend over the 25 years under consideration. In 1906, 1,213 women died from causes associated with childbirth. In 1930, there were 1,127. The rates were 6.9 and 5.7 per 1,000

total births, respectively. A large proportion of these deaths were due to puerperal septicemia—39.2 per cent the first year and 37.4 per cent the last.—*Vital Statistics,* Emlyn Jones, M.D., Chief, Bureau of Vital Statistics; *Pennsylvania's Health,* 10: 77–78 (Jan.–Feb.), 1932.

Post-Vaccinal Encephalitis in Holland—According to a report by the Inspector-General on Vaccination in Holland, there were 866,100 vaccinations performed in that country from 1924 to May, 1931, and of these, 186 cases were followed by encephalitis, which is equivalent to 1 case of encephalitis to every 4,656 vaccinations.

A special commission appointed to examine each case classified them in 4 groups—namely, (1) undoubted cases; (2) almost undoubted cases; (3) doubtful cases; and (4) very doubtful cases. In the statistics drawn up by the Inspector-General only the first 2 groups were considered. Among about 62,000 children vaccinated in the 1st year of life, there were only 3 cases of encephalitis, and among 137,000 children between the ages of 1 and 2 years only 5 cases, or 1 case among 25,000 vaccinations in children under 2 years of age. All these patients recovered without sequels. Among 660,000 children between 2 and 11 years there were 159 cases, or 1 in 3,570; 55 of these died, a proportion of one death to 15,749 vaccinations. In 1930, 5 cases occurred among 27,131 vaccinations, or one case among 5,426 vaccinations. There has been a great decline in the number of vaccinations after the small outbreak of smallpox in the second half of 1929, and as compulsory vaccination at school age has been temporarily suspended, no case has occurred between May, 1930, and May, 1931, although between 24,800 and 25,000 vaccinations were performed during that period.—*Bull. Office Internat. d'Hyg. Publ.,* Oct., 1931, p. 1804; *Canad. M. A. J.,* 26: 301 (Mar.), 1932.

PUBLIC HEALTH ENGINEERING

AN INVESTIGATION OF THE MONTREAL TYPHOID EPIDEMIC OF 1927*

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A PRIMARY outbreak of approximately 2,600 cases of typhoid fever reported during March and April was followed by a remission of 3 weeks and a sharp recrudescence of nearly as many cases in the following month of May. A total of 5,353 cases developed with a mortality of approximately 10 per cent.

Clear indications showed within the first week of reports that the disease was milk-borne and probably attributable to the distributions of the products of two associated milk companies (M and N). Notice was given by the Health Department Director about March 12 to increase the temperature of pasteurization of all milk in Montreal above that re-

* Abstract of paper read at a Joint Session of the Laboratory and the Food, Drugs and Nutrition Sections of the American Public Health Association at the Sixtieth Annual Meeting at Montreal, Canada, September 16, 1931.

quired, 142° F. for 30 minutes, to 146° or over. A start in the decline of cases occurred about 2 weeks later. Approximately 75 per cent of the reported cases were among consumers of M and N milk. These companies supplied but one-eighth of the total milk supply of the city.

The geographic distribution of cases (pin map) and that of the milk supplies of M and N companies were in close harmony, and the earliest cases with the preponderance of incidence were in children and youths.

There was an entire absence of any such geographic relation between the varied distribution of the three public water supplies and the intensities of incidence of the infection. There was also an absence of bacteriological evidences of water supply pollutions.

A discovery was made in April that a man "C"—the supervisor of the pasteurization equipment in the M and N plants—from January 30, 1927, was a typhoid carrier, and he was discharged April 15. A man "B" who succeeded "C" as operator of the same equipment retired from the M and N plants on April 25 by reason of illness. On May 20 there was obtained a positive Widal test with his blood.

The carrier "C" and this incipient case successor, "B," were in direct charge and operation of the holding tanks, regenerator, cooler and filling mechanisms, each of which possessed certain defects of structure. Also, the records and the evidence as to the methods of cleansing and operation of them by these infected workers indicated the existence of several well defined opportunities for those degrees and times of typhoid infections of the pasteurized milk as might readily account for the peculiarly spaced incidences of the outbreak and its recrudescence.

Reports of procedures followed by employees in the pasteurizing room showed deficiencies in operating methods of a serious nature, such as standing on the edge of the cooler trough with dripping boots, stirring the pasteurized milk with a dipper picked up from the floor, immersing the hands in the cooled milk to adjust the bulb of a thermometer.

Temperature records were available and led to interpretations of operating conditions as they pertained to the holding tanks, and indirectly to some of the other apparatus. These, together with accurate temperature studies made under ideal operating conditions, presented a picture in which the typhoid carrier and his successor had rôles of major importance.

No attempt was made to assume any specific course of events which led to the infection of pasteurized milk in the M and N plants. Several hypothetical channels of readily recognizable causative potentialities may be listed as follows:

Infection of the milk holding tank by plant employees operating in the pasteurizing room, followed by incubation in the tanks. Lapses in heat treatment of the tanks resulting in failure to sterilize them. Infection of the pasteurized milk and lack of destruction of typhoid organisms because of low temperatures in the first milk and resulting in the infection of the foam. In addition, leakage of this first underheated and possibly infected milk through outlet valves and possible incubation in the pipe lines. The relation between lapses in hot cleaning and pasteurizing temperatures shows most striking correlations with the rises and declines in the outbreak and its recrudescence.

The regenerator also played a potential rôle in both infection and the incubation of any already infected pasteurized milk under certain conditions of operation. It, in itself, could have been directly infected, as typhoid carrier "C" was immediately responsible for its preparation for the day's run every morning he was on duty. The infection could also have readily incubated in it during the run or by reason of lapses in hot cleaning during the night.

The cooler, handled and especially as subjected to gross treatment during use by the typhoid carrier, could have been infected with resulting incubation and heavy inoculation of

the milk. Incubation of colon bacilli was proved in the cooler on surfaces, the drippings from which went into the pasteurized milk.

Cream might have contributed to the second outbreak by becoming infected in a milk storage tank, and by subsequently infecting the milk through a leaking valve in a connecting line, or by the passage of milk through a pipe previously used for cream. The infected cream itself may have been responsible for a certain number of cases.

While these possibilities are specifically listed, the epidemic may have been caused by a combination of them or by other unrecognizable factors operating within the plants.

In consideration of the possible rôle of country infected raw milk in the causation of the outbreak it may be said that while there were shown to exist potentially dangerous pollutions of utensil wash water supplies employed at some of the country receiving stations of the M and N Companies, diligent search for centers or individual typhoid cases in the country milk sheds of the M and N Companies failed to reveal any origins earlier than the time of the fully established outbreak in the city or having any direct causal relation thereto. The few cases suspected of such a relation were given special consideration and nothing was found to warrant attributing the causation of the outbreak to them. Also the records of the M Company indicated satisfactorily that no diversion of raw milk from the process of pasteurization occurred during the period of the epidemic. Even if raw milk in substantial amounts had been so diverted and distributed without pasteurization, it would have been subjected of necessity to some of the conditions found to afford ample opportunities for the typhoid infection of the pasteurized milk in the plants.

The evidence found has been wholly on the side of the infection and probable incubation of pasteurized milk and/or other dairy products distributed by the M and N Companies as the causative factors of the primary outbreak and its recrudescence.

NOTE: Full report published in pamphlet form by the Provincial Bureau of Health of the Province of Quebec, Quebec, Canada.

THE STATE BOARD OF HEALTH OF MISSOURI
DIVISION OF PUBLIC HEALTH ENGINEERING AND SANITATION
RECOMMENDED SPECIFICATIONS COVERING SANITARY CONSTRUCTION FEATURES OF DRILLED WELLS
(Revised 1932)

1. *Samples of Cuttings*—At least 1 week before starting to drill the well, the driller shall send a written request to the State Geologist, Rolla, Mo., who will furnish a set of small sacks, a drill record book, and a letter of instructions regarding the collection and handling of drill cuttings. The well driller shall save a sample of cuttings from every 5 ft. and place them in the sacks, properly labeling same. These cuttings shall be taken from *the bailer* and not from the slush pit. The sacks containing the cuttings shall be sent to the State Geologist at Rolla each day until the casing is set, after which they shall be submitted weekly. These cuttings shall be examined by the State Geologist or his assistants.

2. *Casing*—Upon the basis of available records, the State Geologist will recommend the depth of casing advisable to shut out effectively surface water and shallow ground water that may be contaminated. The casing shall be extended to at least this depth, and deeper if necessary, so as to case off all openings or soft or broken ground. When the drill hole reaches the depth at which the casing shall be set as recommended, drilling shall cease until the casing is set and the seal has been tested to demonstrate that it is water-tight.

The well shall be cased with a screw joint steel or wrought iron pipe of corresponding size and weight of casing, installed in a watertight manner. The pipe or casing shall conform to the following minimum specifications for weight and thickness:

Size Inches	Thickness Inches	Wt. (lbs.) per ft. with Threads and Couplings *	Threads per inch
4	0.23	10.8	8
5	0.25	14.8	8
6	0.28	19.1	8
7	0.30	23.7	8
8	0.32	28.8	8
9	0.34	34.1	8
10	0.36	41.1	8
11	0.37	46.2	8
12	0.37	50.7	8

* This weight is based on 20-ft. lengths. A 5 per cent variation is permissible.

When the water is known or suspected to be corrosive, the casing shall be of corrosion-resistant material and shall be protected from the action of corrosive waters. In order to protect the casing, the hole shall be thoroughly mudded with clean mud-laden fluid or preferably the casing shall be sealed by the use of cement applied in an approved manner. The cement shall be placed between the outside of the casing and the wall of the hole throughout the entire length of the casing or at least through those horizons which yield highly mineralized water.

The well casing shall be extended to a point not less than 6 in. above the elevation of the finished pump room or pump pit floor, and shall be provided with a thread at the top.

3. *Seal*—A satisfactory seal shall be made or installed at the bottom of the casing by one of the following methods:

(*a*) Setting the bottom of the casing on a shoulder in the well made by reducing the size of the drill hole, and sealing with a lead packer or cement grout applied by an approved method. An approved method of sealing the casing with cement requires that the cement be forced up behind the shoe several feet.

(*b*) Driving or rotating the casing into clay, shale or similar sealing formation.

(*c*) Installing an expanding rubber packer.

The seal shall be tested by bailing out the well and making sure that there is no leakage into same over a period of not less than 12 hours. When cement grout is used for sealing the casing, the test for leakage shall not be made until the cement grout has set up. When no appreciable amount of water has been encountered up to time of sealing, a sufficient quantity of water to fill the space between the casing and drill hole shall be run into the annular space on the outside of the casing to test the seal.

The well casing shall be tightly sealed to prevent the downward percolation of surface water or other undesirable waste around the outside of the casing. This can be accomplished by thoroughly puddling the space between the outside of the casing and the wall of the hole with clay and sealing the upper 5 ft. with concrete. Whenever a gravel wall well or gravel packed well is constructed the outer casing shall not be removed from the hole but upon the completion of the well it shall be sealed in place in the usual manner.

4. *Water Analysis*—When a waterbearing stratum, furnishing the required volume of water, is encountered at a satisfactory depth, samples of water shall be collected at the end of the test pumping run and submitted to the State Board of Health, in containers provided, for complete chemical and bacteriological analyses to determine the suitability of the water for a general city supply.

Before setting the pump for the test run, the well shall be thoroughly disinfected with calcium or sodium hypochlorite. In case the permanent pump is not used for the test run, the disinfection shall be repeated just previous to the installation of this pump. Disinfect the well with fresh dry chlorinated lime (also called calcium hypochlorite or bleach powder) made into a solution as follows:

(1) Two pounds of the disinfectant shall be used in order to assure satisfactory results.

(2) Make the powder into a smooth paste with a small amount of water, crushing out all lumps.

(3) Dissolve the paste in about 2 gal. of water.

(4) Allow solution to settle; pour the clear solution into the well; and if possible mix with the water in the well.

(5) Allow the solution about 2 hours' reaction time before pumping the well.

Other prepared chlorine compounds may be used as a substitute for chlorinated lime provided sufficient quantity is used to make available 0.5 lb. of free chlorine.

5. *Records*—The driller shall note in the drill record book the location and depth of any openings or soft or broken ground encountered, together with complete information on the depth of casing, method of sealing same, and result of seal test. Also, the driller shall note in the drill record book the depth at

which water is encountered, the static water level as the drilling progresses and at the completion of the well.

Immediately on completion of the well, and prior to completion if requested, the driller shall forward all samples of cuttings not previously submitted and the drill record book to the State Geologist, who will correlate same and furnish the owner with a copy of the completed log of the well.

6. *Approval*—These specifications shall be carried out in a manner satisfactory to the State Board of Health of Missouri, before this portion of the work is accepted.

RECOMMENDED SPECIFICATIONS COVERING SANITARY FEATURES IN THE INSTALLATION OF WELL PUMPING MACHINERY
(Revised 1932)

A. The use of a well pit or subground-level pump room shall be avoided wherever practical on account of the possibility of stoppage of the drain or ejector and neglect to replace the well top seal after making repairs.

B. Where the pump is installed without a pit—

1. The pump shall be installed on a concrete base of sufficient height to permit the outside casing to extend not less than 6 in. above the pump room floor, and to enable the installation of a suitable connection as noted under B–2.

2. The annular opening between the outside casing and pump column shall be closed by means of a suitable water-tight connection which will effectually prevent waste water, oil, insects or other contaminating material from entering the well.

C. Where the pump is installed with a pit or in a pump room below the ground level—

1. The sides and bottom of the pit or pump room, below the ground level, shall be constructed of water-tight concrete. The pit shall be left uncovered to permit easy inspection by the pump operator, and shall be surrounded by concrete curb at least 6 in. high and a pipe railing.

2. The annular opening between the outside casing and pump column shall be closed by means of a water-tight connection capable of withstanding for 24 hours, without leakage, the water pressure resulting from complete filling of the pit with water. The types of connections approved are given below in order of preference.

a. An all flanged or threaded connection.

b. A stuffing box connection.

c. Metal to grouted cement connection with suitable gasket (not rubber); to be used only when joint carries weight of pump column and the pump is rigidly supported to prevent vibration.

Any vents provided for the well shall be extended by a pipe with screw or flange connections to a point above the floor level. A return ell shall be screwed on the upper end of this pipe, and screened.

3. Drainage shall be provided for the pump pit or pump room by one of the following methods:

a. By means of a drain consisting of a sewer pipe, not less than 6 in. in diameter, with cemented joints, installed in a straight line and on an even grade of not less than 0.6 ft. per 100 ft., with a concrete bulkhead at the outlet to insure an open discharge at all times; provided that under no conditions shall this drain receive sewage, or be connected to a sewer, and that the bottom of the pit so drained shall be above the high water level in any adjacent watercourse.

b. By means of a pump or ejector drawing from a sump of not less than 12 cu. ft. capacity situated so as to collect all waste water. This pump or ejector shall operate automatically or be connected to some moving part of the pump head, so as to operate continuously with this pump, and shall discharge above the pump room floor level into a suitable drain at a point safely removed from the pump pit or pump room.

4. The bottom of the pit or pump room shall be sloped away from the top of the well casing toward the drain or sump with sufficient grade to insure ready flow. At least 12 in. difference in elevation shall be provided between the top of the well casing and high water level in the sump.

D. A separate pump column, suction or discharge pipe shall be installed inside the well casing in all instances, whether the well is to be pumped by suction, air lift or deep well pump.

E. These specifications shall be carried out in a manner satisfactory to the State Board of Health of Missouri, before this portion of the work is accepted.

INDUSTRIAL HYGIENE

The **Ventilation of Factories and Workshops**—Section 7 of the Factory and Workshop Act, 1901, requires that in every workroom in a factory or workshop sufficient means of ventilation must be provided and maintained, with certain further special conditions to meet certain special hazards. There is, however, a more important provision, under Section 79 of the Act, which enables the Secretary of State to make such regulations as appear to him to be reasonably practicable and to meet the necessity of the case. Injury to health must be shown to exist in a particular manufacture or process, as in a report from one of the medical inspectors. In the case of dispute and where the matter cannot be settled by conference with all parties concerned, the draft code must be referred to an arbitrator appointed by the Secretary of State. Many codes of regulations relating to different industries and processes have been established in this way.

Various codes provide for at least 6 changes of air per hour in an ordinary workroom, but cannot of course be applied to workrooms ventilated only by natural means. Yet, in warm weather in small and moderate sized rooms, provided the windows or other ventilators are of sufficient size, properly distributed and freely used, the air will normally be changed more than 6 times per hour. Often the area of window opening is too small; at least 5 sq. ft. of opening per 100 sq. ft. of floor area should, if possible, be provided.

In dealing with injurious dust, gas or vapor rising from manufacturing processes, 3 methods of prevention obtain: (a) fully enclosed machines, (b) damp processes, and (c) mechanical extraction.—Leonard Ward, *J. Roy. San. Inst.*, 52, 5: 196–200 (discussion 214–216) (Nov.), 1931. E. R. H.

Air Conditioning Hut—Starting with the air in the hut cool and still, it is made to circulate among the visitors present by starting the fan, which increases the sensation of coolness although the actual temperature of the air remains the same. By standing between the electrically heated panels, however, the body receives radiant heat, which compensates for the heat delivered up to the moving air, and this combination of radiant heat with air at a comparatively low temperature moving at a reasonable velocity produces a very favorable sensation.

As soon as humidity is produced by means of steam jets, the temperature of the air is also slightly raised owing to the introduction of steam and there is at once a feeling of lassitude as the cooling power of the air is reduced (sufficient heat is not removed from the body). Starting the fan under this condition immediately gives a sensation of comfort although the temperature and humidity remain the same as before. If the fan is stopped and humidification continues to a point at which fog is produced, the atmosphere becomes oppressive but there is immediate relief in again starting the fan.

By keeping the air in circulation through the convection heaters, its temperature gradually increases, which causes a fall in the relative humidity, but so long as the air is moving the conditions are pleasant. In contrast, under the same conditions of humidity and temperature but with still air, discomfort is felt. If at this point the hu-

midity is increased, the discomfort is increased, as there is produced an atmosphere which is both very warm and very humid, and without air movement. The pulse rate and the breathing rate are found to increase, but if now the fan is started there is a general feeling of relief, the breathing becomes more free and yet the temperature and humidity have remained the same.

When the warmed and humidified air is allowed to remain stagnant for a few minutes, there is a considerable difference in temperature at different levels. The upper air is much warmer than the air near the floor. This condition produces an uncomfortable feeling of oppressive warmth round the head and coldness of the feet.

The principles emphasized in the hut demonstration are capable of wide application in industry. It is shown that for both comfort and efficiency the heat removed from the body must balance the heat produced when working. An atmosphere incapable of removing sufficient heat can be improved if the air is kept in motion. Where the heat loss from the body is excessive the remedy is a supply of radiant heat.

The air conditioning hut has served the useful purpose of bringing these facts to the notice of employers and others who had been unable to produce satisfactory conditions, consistent with the carrying on of manufacturing processes by the application of older ideas of ventilation.—Hilda Martindale, Home Office Industrial Museum, *Annual Report of the Chief Inspector of Factories and Workshops* (Great Britain), 1930, pp. 78–81. E. R. H.

Ventilation as a Physiological Problem—Ventilation, derived from the Latin *ventilare*—" to fan "—means no more than the maintenance of air movement. Nevertheless, the common conception of effective ventilation is that of an adequate supply of fresh and of pure air. The widespread belief in the necessity for freshness and purity of the ventilating air has held until recent times. It is now realized that the chief function of ventilation is the provision of such an external environment that the body may, in its turn, maintain the physiological integrity of its internal environment—and that with the minimum of strain.

In a series of experiments, Leonard Hill in 1913 finally disposed of the claim advanced that expired air contains injurious organic matter other than bacteria.

Even when at rest, the human body produces no inconsiderable quantity of heat, and all excess must be got rid of; otherwise ultimate destruction of the body occurs more surely and more rapidly than with the retention of any other waste product. At least three-fourths of the heat produced in muscular effort is a waste product to be removed; otherwise heat stroke may ensue. The more subtle or premonitory stage of heat-stagnation is less obvious and is also more frequent. The strain is thrown on the cardiovascular system, while warm moist atmospheres also affect the mucous membranes of the respiratory tract.

Clothing aggravates the stagnation of heat. The part which clothing may play in the heat loss of the body is of paramount importance. It is the beneficial effects of air movement which are largely negatived by unsuitable clothing. A human being is able to adjust himself to his surrounding within fairly wide limits and also has power of acclimatizing himself. In still air the sensory nerves of the skin are not stimulated, by which an increased rate of sweat production is brought about in acclimatization.

Orenstein and Ireland showed that the efficiency of natives in the Rand mines was greatly improved by increase in the cooling power of the environment. For

sedentary work, the dry kata-thermometer should be 6, for light muscular work 8, for heavy muscular work 10, while corresponding figures for the wet kata are 18, 25 and 30, respectively. Many other investigators have found similar kata conditions necessary.

The new orientation in the scientific attitude to ventilation seems to be thoroughly justified both by physiological experimentation and by practical experience in industry.—R. C. Garry, University of Glasgow, *J. Roy. San. Inst.*, 52, 5: 208–213 (discussion 214–216) (Nov.), 1931. E. R. H.

Vaccine in the Prevention of the Common Cold. An Experiment—An experimental study was made to determine the effects of vaccination on the incidence and duration of common colds. Eighty medical students were vaccinated with a prepared, partially detoxicated vaccine, and 82 medical students acted as controls.

The statistical results of the experiment show little, if any, improvement as regards common colds in the experimental group as a whole compared with the control group. Individuals in the experimental group appear to have received some benefit. This is in accord with the findings that the group as a whole was not completely desensitized to the particular antigens used. Better results may be possible with an increased dosage of the vaccine or by employing with each individual the particular antigens to which he may be shown sensitive.—W. E. Brown, *Am. J. Hyg.*, 15, 1: 36–63 (Jan.), 1932. E. R. H.

Vasomotor Reactions to Localized Drafts—When the unclothed body was exposed to uniform atmospheric conditions the average temperature of the skin varied directly with the effective temperature of the atmosphere. The skin temperature dropped about 1° C. for every 2° F. drop in effective temperature.

Under uniform atmospheric conditions, the average skin temperature was 25.8° C. for *cold*, 29.5 for *cool*, 32.1 for *warm* and 33.5 for *hot*, while variations amounted to as much as plus 4 to minus 8.3 for *cold* to plus 1.9 to minus 1.6 for *hot*, depending upon the part of the body whose skin temperature was taken.

Under varying atmospheric conditions affecting the whole body uniformly, the temperature of the nasal mucosa followed that of the skin of the face, ranging about 3° below it. A localized draft on the head caused a fall in the skin temperature of the face and in the temperature of the nasal mucosa with less marked fall in the temperature of the mouth.

Chilling of the feet by local drafts did not materially affect the skin temperature of the rest of the body, but it caused a distinct rise in the temperature of the nasal mucosa. One subject showed entirely abnormal responses differing sharply from those found for the other six subjects.

The results correspond with those of Hill and Muecke, of Grant and his associates, of Azzi, and of the New York State Commission on Ventilation, in showing that chilling of the body surface results in contraction, and ischemia and dryness of the mucous membranes of the nose.

Nothing was found to indicate that localized drafts differ in respect to vasomotor reactions from uniform chilling of the body surfaces as a whole, or to suggest a special influence on respiratory infection. Chilling of the head caused less disturbance in the nose than exposure of the entire body to a corresponding effective temperature, while chilling of the feet actually caused dilation of the blood vessels of the nose and throat.

The experiments were carried out on a small group of normal young men

without clothing. While the effects of drafts at higher room temperatures might yield quite different results. The significant thing is that the investigation does not confirm the general belief that chilling of the feet is especially harmful.—C.-E. A. Winslow and Leonard Greenburg, *Am. J. Hyg.*, 15, 1: 1–35 (Jan.), 1932. E. R. H.

Influence of Infra-Red Radiation in Relation to Ventilation and Heating—Many people feel stuffy and uncomfortable in a closed room warmed by a plenum system, or by dark and dull red sources of heat. The feeling of stuffiness has been attributed to some unknown X quality of the air, to its ionization, or to addition of vapor arising from the roasting of dust particles on heating surfaces.

Some have thought that the air is made over dry, and have placed bowls of water on stoves or in front of the old-fashioned gas fire. No evidence of any significant alteration in the humidity of the air has, however, been forthcoming, and proof of significant change in ionization has failed to appear.

The conclusion to be drawn from personal experiments is that stuffy feelings are produced by dark or dull heat rays acting on the skin, and reflexly through the nerves of the mucous membrane of the nose. It is the longer infra-red rays which produce this effect, rays which are absorbed by a thin film of water, and which have almost no power of penetrating the outer surface of the skin. These rays are largely screened off from sunlight by the water vapor in the atmosphere, but are abundant in a green-house heated by sunlight since they are given off therein by the heated surfaces, hence the stuffy effect noted.

The close relation between the state of the skin and asthma is generally recognized. Some 60 per cent of asthmatics are said to suffer from some form of dermatitis, and many asthmatics are benefited by light baths. Storm Van Leeuwen has found that fan impulsion of pure dust-free air through their sleeping compartments relieves many asthmatics and chronic bronchitics. It may well be that the effect is not wholly due to dust removal, but partly to a cooling of the face, which antagonizes the dark heat rays in a closed room. By a ventilation of rooms, adequate to remove infecting microbes and prevent the congestion effect of long dark heat rays on the nose, I believe, the number of colds may be reduced. It is known that open air workers suffer very little from colds, and have a low death rate. Proper feeding with plenty of milk, butter, fruit and vegetables is, of course, also required to keep down infection. If the congestion and closing of the nasal passage is, as I think it is, a sign of ill ventilation, then it follows that enough cool air should be sent through every room to cool the face and counteract the effects of the long infra-red rays.

—Sir Leonard Hill, *J. State Med.*, 39, 12: 683–687 (Dec.), 1931. E. R. H.

Factors in the Production of Nervous Lesions Following Electric Shocks—In the present study rats were used as the experimental test animal. The author's summary follows:

When the current from a 1,000-volt alternating or continuous circuit was allowed to flow through the preparation for one second, abnormalities in the nerve cells of the brain or the spinal cord were demonstrated only in areas traversed directly by the current pathway. The electric current produced damage to nerve cells in experiments where heat production was negligible. If a large current flows through the body for a considerable time, there is marked heat production which causes changes in nerve cells indistinguishable from those produced by the electric current alone.

—Orthello R. Langworthy, *J. Indust. Hyg.*, 14, 3: 87 (Mar.), 1932. L. G.

FOOD AND NUTRITION

A Bacteriological Study of Decomposing Crabs and Crabmeat—Bacteriological studies of Chesapeake Bay crabmeat were made on samples of crabmeat from Maryland and Virginia purchased on the open market, as well as on some whole live crabs. Spoilage experiments were conducted at room temperature and at refrigerator temperature. The author states that the decomposition is due to progressive proteolysis associated with a rapid increase in ammonia content. The predominating bacterial types encountered were the Gram-negative non-spore-forming bacilli, and the Gram-positive streptococci. Decomposition experiments in which sterile crabmeat was inoculated with pure cultures of *Proteus vulgaris* resulted in a proteolytic decomposition of the meat, with the pH changing from 7.0 to 6.8. In the spontaneous decomposition of crabmeat, the pH changed from slightly alkaline to pH 8.2–8.6.

The writer concludes that the decomposition was due primarily to the action of the Proteus group, possibly supplemented by some of the Pseudomonas and Flavobacterium groups. There apparently is no relation between the "age" of decomposition and total aerobic counts. There is no close relation between the "age" of decomposition and the pH value. Spore-forming anaerobes are not concerned in the decomposition. Spoilage at refrigerator temperature fails to show an increase in the *B. coli* score. Bacteria belonging to the following genera have been isolated: Escherichia, Proteus, Zopfius, Alcaligenes, Flavobacterium, Achromobacter, Pseudomonas, Micrococcus, Sarcina, and Streptococcus.

The delicate Nessler ammonia test is tentatively proposed as a means of detecting ammoniacal spoilage in crabmeat during the incipient stages before macroscopic signs of proteolytic decomposition are apparent. No correlation is made between the type of spoilage studied and the production of toxic substances.—Marvin M. Harris, *Am. J. Hyg.*, 15: 260 (Jan.), 1932.

The Poisonous Principle of Lathyrus and Some Other Leguminous Seeds—The seeds under consideration in this article are *Lathyrus sativus* and *cicera; Ervum lens* (lentils); *Pisum sativum* (the common cultivated pea); *Soya hispida* (the soya bean); *Vicia sativa* (tares); *Cajanus indicus* (the pigeon pea); and *Ervum ervilia* (the bitter vetch). In all these seeds the poisonous body is an acid and apparently the same acid in all. In large doses its action on frogs is always qualitatively the same, namely, depression of the brain and spinal cord, succeeded, if the dose be not lethal, by more or less increase of spinal reflexes, and the motor nerves are not paralyzed. The muscles are also poisoned, more especially in the area of the injection but also more widely through the blood. With very small doses the depression stage may be hardly noticeable and there is an equally slight increase of spinal reflexes.

Rabbits (herbivora) are very insusceptible, but with large doses show a certain amount of weakness of the legs.

In monkeys after a large or frequently repeated smaller dose, the symptoms broadly are those of depression and irritation of the brain and cord, but in detail they vary somewhat. Sometimes drowsiness and lethargy are very promi-

nent; sometimes weak tremors or coarse jerking of muscles, or clonic or tonic convulsions of groups of muscles in rapid succession and involving the whole body; sometimes a shaking palsy like paralysis agitans. But always there is marked paresis of the motor tracts and muscular weakness. The more powerful flexors and adductors overcome the extensors and abductors, giving rise to flexion of the joints and adduction of the limbs. One limb is often earlier and much more affected than the others. The chief effect, therefore, is on the cerebrum (fore-brain, motor areas and basal ganglia) and the spinal cord, but it is not always the same part which is chiefly affected and hence the considerable variation in symptoms.

In using 15 different lots of lathyrus it was found that they vary very greatly in toxicity, and this is probably true also of other peas and accounts no doubt for the cases of poisonings which have occurred occasionally among farm stock with soya meal, and with the bitter vetch and lathyrus itself. A lentil feeding experiment on a monkey shows that an individual sample may be very poisonous.

Like opium, coca, tobacco and many other drugs of the same kind, these leguminous seeds may be classed as stimulant-narcotics, that is, stimulants to the nervous system in small doses and narcotic in large doses, with the difference that they are capable of producing much more readily organic degenerative changes in the central nervous system. Fortunately, however, to do this very large amounts are required. —Ralph Stockman, *Brit. J. Hyg.*, 31: 550 (Oct.), 1931.

Midday Meals for Preschool Children in Day Nurseries and Nursery Schools—This is an important contribution from the U. S. Department of Agriculture giving the food value of typical nursery school menus and recipes, in terms of the chemical composition of each child's portion of every dish. As the title suggests, the work is intended especially for persons responsible for feeding groups of preschool children one or two meals a day, but should be helpful in meeting the similar questions arising in hospitals and other institutions, and the question of food selection in homes where groups of young children must be fed.

In a pamphlet of 46 pages, the authors devote two-thirds of their space to a tabular showing of the chemical composition of the ingredients of recipes, in calories and in grams of protein, fat, carbohydrate, calcium, phosphorus, and iron. They include also a brief discussion of food standards for children, of factors affecting the child's food intake, such as appetite, food habits, and the mechanical problems involved in the child's manipulation and mastication of his food. Variations in the cost of menus are discussed, and examples of high and low cost menus for different months are given.—Mary E. Sweeney and Charlotte Chatfield, U. S. Dept. of Agr. *Circular 203* (Apr.), 1932.

Polycythemia in the Rat on a Milk-Iron-Copper Diet Supplemented by Cobalt—Thirty albino rats, 21 days old, were placed in glass cages with their mothers and fed whole milk until the 25th day. After 4 days the mothers were removed and the young rats were then placed in individual glass cages and given a basal diet of whole milk with 0.5 mg. of iron, plus 0.025 mg. of copper daily. At the end of 30 days, manganese, cobalt, nickel and zinc were added. These were fed as solutions of soluble salts and at the following levels: manganese 1.0 mg. as $MnSO_4$, cobalt 0.5 mg. as $CoCl_2$, nickel 1.0 mg. as $NiSO_4$, zinc 0.5 mg. as $ZnSO_4$. Cobalt as $CoSO_4$, in the amount of 0.5 mg., was fed and the results are identical with those obtained with $CoCl_2$.

All animals receiving the cobalt presented a striking appearance. The ears, eyes and paws became a deep red color in contrast to the pink color of the rats of the non-cobalt and normal groups. As long as cobalt was administered the polycythemia persisted. Two animals were kept polycythemic by cobalt feeding (0.5 mg. of cobalt as $CoCl_2$ daily) for a period of 330 days.

There was only 1 fatality and that was an animal which grew well until 2 weeks before death, which occurred at 220 days of age. Hemoglobin, erythrocyte and cell volume values show a parallel rise, while the leucocyte and differential leucocyte counts show no significant alteration.—James M. Orten, F. Aline Underhill, Edward R. Mugrage and Robert C. Lewis, *J. Biol. Chem.*, 96: 11 (Apr.), 1932.

The **Iron Content of Vegetables** and Fruits—Data are given in this report on the iron content of 110 different forms, parts, or varieties of fruits and vegetables, for 82 of which some analyses were made by the author. Twelve of the 110 averages represent dried or mature plant products, and 98 refer to fresh, succulent, or immature plant products. Four classifications were made of the 98 fruits and vegetables tested:

Group 1—13 were found to contain less than 0.00040% of iron and were considered poor sources of iron.

Group 2—44 contained 0.00040% to 0.00079% and were considered fair sources of iron.

Group 3—24 contained 0.00080% to 0.00159% and were considered good sources of iron.

Group 4—17 contained 0.00160% or more, and were considered excellent sources of iron.

The first group consisted almost entirely of fruit and fruit juices. About one-half of the second group consisted of seed pods, blanched leaves, roots and bulbs. In the third group, potatoes and thick pigmented stalks and leaves were of chief importance. In the fourth group, immature seeds of leguminous plants and thin green leaves were of importance, the latter being conspicuous for their iron value. The classification shows, as has often been observed, that much of the iron in plant tissue is associated with the chlorophyll.—Hazel K. Stiebeling, U. S. Department of Agriculture, *Circular 205* (Feb.), 1932.

CHILD HYGIENE

PREVENTION OF CRIPPLING IN CHILDHOOD

A REPORT of the Committee on Prevention and Research of the International Society for Crippled Children, which was presented recently at the meeting of the society at Rochester, N. Y., is of sufficient current interest to give certain excerpts in these comments.*

Wherever, in different parts of the country, the ravages of epidemics, increases in child labor, and the onslaught of depression have been felt, an effort has been made to secure authentic information regarding the status and value of combative measures used. A study of recent literature depicting the laboratory findings of those engaged in searching out means of prevention has been made. . . .

POLIOMYELITIS

One of the most baffling epidemics has been poliomyelitis. At times we have thought we knew something about the type of conflict this enemy would offer. But we have learned that, although its mode of attack is essentially the same, the strategy of its attacks varies. Consequently it continues to take heavy toll of children's lives and to leave many wounded and crippled upon the field. Dr. R. I. Harris of Toronto estimates that it is one of the most important causative factors of crippling, averaging 40 per cent of the cases, while tuberculosis follows with an average of 30 per cent. In the year of 1931 there were reported some 13,000 infantile paralysis cases, one-third of which occurred in New York City. . . .

Epidemiologists are of the belief that there are many more unreported cases of infantile paralysis than are reported. As in other communicable diseases, it is believed there are many mild and abortive cases. . . .

A germ that cannot be captured is extremely difficult to study. Nevertheless, what it does or does not do can be brought under observation. It has been established that one who emerges the victor after one attack is immune to others. This led to the hope that the blood of such cases might help counteract the disease in other individuals, striking a spark of hope that a positive serum had been found. Recent experiments, however, have not fanned that spark into a flame as yet. Two difficulties have been met. One is to produce the serum in sufficient quantities for widespread use in the face of an epidemic, as its preparation in animals has not been perfected, and another is to discover or be apprised of the illness early enough for the serum to be effective. . . .

Treatment so far has been, for the most part, the injection of serum. At first it was believed that only the serum from convalescents could be used, and as this could not be secured in great quantity the amount to be administered was limited not only as to quantity, but as to the type of patient to receive it. . . . All the various forms of infantile paralysis can be reproduced in the monkey by injecting, under suitable conditions, extracts of the spinal cord of patients who have died of poliomyelitis. It has also been found that the serum to be used does not need to be taken from the blood of the convalescent immediately. It can be preserved in the laboratory under proper conditions for months and even a year or two without losing its effect, it has been stated.

More recently the blood of so-called normal persons has been thought to carry neutralizing substances, for the virus of infantile paralysis. Although according to Wywer, Park, and Banzhof, in the April, 1931, issue of the *Journal of Experimental Medicine*, while "Pooled serum from 'normal' adult donors has proved effective in neutralizing virus, its potency is approximately one-half that of convalescent serum." . . .

There has been a tendency to attribute to rural sections the greater prevalence of this disease. However in 1930 Ohio reported that 61 per cent of its cases were urban and 39 per cent rural. The *Weekly Bulletin* of the City of New York Department of Health for August 22, 1931, states that if the epidemic year of 1916 is excluded only a slight rural preponderance is found—not different from that of whooping cough.

Dr. Park seems inclined to view isolation as

* A copy of the full report embodying recent bibliography may be obtained from the Cleveland Child Health Association at a cost of 5 cents.

not very valuable after the early acute stages, saying that many cases are so treated after the danger is passed. Most of us, however, would probably be inclined to agree with Dr. Parran, New York State Health Commissioner, who says, "In the absence of any better known method of combating infantile paralysis, the New York State Department of Health will continue to recommend the use of human serum unless its usefulness should be completely disproved." . . .

In Boston the Harvard Infantile Paralysis Commission, which has been functioning since 1916, was vigorously active, spotting cases and collecting serum. New York City appropriated $75,000 emergency funds. A battalion of orthopedic nurses was concentrated in Brooklyn to care for anticipated cripples. Stations were set up to take blood from convalescents for the treatment of infantile paralysis.

At the end of the infantile paralysis season, 3 Stanford University men, Dr. Charles Eglof Clifton, Edwin William Schultz, and Louis Philipp Beghardt, announced that they had isolated and measured an organism which they were certain caused infantile paralysis. . . .

The studies of Dr. Frederick Eberson at the University of California are of interest. He has been able to segregate germs and produce a serum that checks infantile paralysis in monkeys, he reports, though he is not prepared to vouch for its success with human beings. Convalescent serum has also been collected and distributed by the Hooper Research Institute of the University of California.

Edna Foley, a member of this committee, says, "I am not sure we know any more about the prevention of poliomyelitis than we did but certainly we know a lot more about the prevention of deformity, the protection of weakened muscles, and the restoration of strength to paralyzed muscles by proper treatment." . . .

An interesting method of treatment is advocated by Dr. Henri Bordier, of Lyon, France, consisting of the association of spinal radiotherapy and diathermy administered to the affected limbs, with the addition, where necessary, of galvanization of the atrophied muscles. Hydrotherapy, as tried in various places, is proving of value too. . . .

TUBERCULOSIS

Regarding tuberculosis of the bones and joints, Dr. Maxwell Harbin of Western Reserve University sounds an optimistic note, "To date there has been a steady decrease in incidence of tuberculous disease of bones and joints in childhood, although it is my impression that there has been an increase in the incidence in adults. It would seem that the children have perhaps been protected partly by public health measures and that we are beginning to reap benefit from this source. Later, perhaps, with the letting down of public health activities, which may occur as a result of the depression, this situation may be changed."

This opinion is held by a number of other investigators throughout the country. Certainly not so many or so serious cases of tuberculous bone and joint disease are seen in the wards of our hospitals as were a decade or two ago.

Preventing young children from coming into contact with the tubercle bacilli is the best means of prevention. Inasmuch as the two sources of the bacilli are known, the matter of prevention may appear, superficially, to be a fairly easy one. The human source is the most common one, and in many respects the most difficult to find and handle; the bovine source, which is responsible in some places, it is estimated, for between 10 and 15 per cent of the tuberculous joints and bones, should be watched more carefully. General pasteurization of milk supply eradicates a large percentage of this danger. But pasteurization is only adequately accomplished, as a rule, in large centers. In smaller towns and rural sections of the country there is more danger from bovine tuberculosis. The eradication of bovine tuberculosis has been aided by the combined efforts of federal and state governments until a decrease in the per cent of cattle reacting to tuberculin has decreased by more than half in the past 15 years. Nevertheless, it is still estimated that in cases of children under 5 years of age, suffering from tuberculosis, 21 per cent are caused by the bovine type of infection; in cases between the ages of 5 and 16 years, 26 per cent are of this type. . . .

It is recognized that other communicable diseases may account for some of the crippling, but these bear a very small proportion of the total. Syphilis now comes under surveillance earlier than formerly and is more intensively treated. Diphtheritic paralyses are gradually fading out of the picture due to the exact knowledge we have of this disease as to cause, prevention, and cure.

CEREBRAL PALSIES AND BIRTH INJURIES

While there is some scattered experimentation of promising value going on at present for the prevention of cerebral palsies and birth injuries, little of note has appeared concerning these subjects the past year. Dr. Maxwell Harbin says, "The prevention of Erb's and Erb-Duchenne's palsies lies largely

in the realm of the obstetrician who delivers the child. Certainly with the exercise of due care a tremendous number of these injuries may be avoided. Therefore, it would seem that propaganda relating to the obstetrician is most important. It should be emphasized in the teaching of medical students as well as the instruction of internes in hospitals where there is an obstetrical service." Full consideration to this phase of the subject is given in the White House Conference on Child Health and Protection reports. Dr. Harbin says further, "Recognition of the presence of a contracted pelvis in the female before birth is of tremendous importance in prevention, as well as the very careful supervision by the obstetrician of the female primipara during pregnancy and labor. Even with close observation it is next to impossible to differentiate between cerebral damage resulting from actual laceration of the brain tissue and damage resulting from pressure by hemorrhage. It is possible that early craniotomy may result in some relief from the latter class although it has seemed impracticable and has not been practised to any extent to date."

Dr. Helen MacMurchy believes, "It would seem that the chief means of prevention of these injuries is in better obstetrics and in the better education of the public. Medical students in their undergraduate courses and medical practitioners in postgraduate courses need more satisfactory instruction, especially in regard to the dangers of instrumental interference. The general public needs education in regard to the danger of instrumental interference and the danger of pressing on the medical attendant, against his own better judgment, injudicious means to hasten the occurrence of birth."

Dr. E. C. Hartley thinks that while the question of birth injuries "may be met in part by better obstetrical care, there is still a background of which at present we know nothing, but which must be understood in order to make any great impression upon the incidence of birth injuries." He refers to "a peculiar susceptibility which some children appear to have for injury at birth," into which he believes "some constitutional or other factor enters to render some children more liable to birth injury than others." . . .

Dr. Fred L. Adair has been studying the subject of obstetrical birth injuries, in Chicago, and at Harvard, Bronson Crothers has been interesting himself in the neurological aspects of such injuries. Neither of them has completed his work, but the quality and extent of their investigations promise much for future preventive methods.

RICKETS AND NUTRITIONAL DISORDERS

Deformities from rickets are among the most common and, at the same time, the most needless of any known. That the present period will see an increase in this type of crippling seems not at all improbable, although education has increased widely the use of protective means up to this time. At one health center in New York City, where the per cent of undernourished children has been carefully diagnosed during the past 3 years, it is reported that malnutrition has increased from 18 per cent to 60 per cent since 1928. Public health nurses report that their work is handicapped because parents cannot provide their children with the diet recommended. In Louisville, Ky., one agency reports a decrease of 1,000 in the number of children able to meet the health and weight standards . . . Any extensive data regarding conditions arising from malnutrition cannot be secured at present, and perhaps it will be difficult to do so at the close of the present economic period. There can be little question, however, regarding the findings of school examiners, pediatricians and general practitioners in this respect during the coming years.

Methods of preventing rickets have been under investigation since Glisson's work on etiology in 1650; Mellanby's work in 1918 on antirachitic factor or vitamin was followed by the demonstration of Huldschinsky in 1919 of the curative value of ultraviolet rays of the mercury vapor quartz lamp. The preventive and curative value of this treatment has also been thoroughly proved by Gerstenberger, and others. Hess and Unger made the observation in 1921 that sunshine has a similar action on rickets; the following year McCollum, Simonds, Becker and Shipley proved the existence of vitamin D and that cod liver oil was its most concentrated source. Next came the discovery that food containing cholesterol or allied substances could be activated by ultraviolet rays and given antirachitic property. . . .

Unobstructed sunshine is the cheapest and most effective of any of the elements discovered. But in smoky, foggy cities the alternative is diet control and the use of potent cod liver oil. The ingestion of a diet rich in calcium, phosphorus and vitamin D usually results in a definite change within a period of from 10 days to 2 weeks. The ultraviolet lamps on the market should be used with caution and under the direction and supervision of a physician. . . .

CHILD LABOR

The Committee on Education and Training

of the White House Conference learned that, "Although 15 states and the District of Columbia apply the minimum age provisions to all gainful employment, and 28 to a more or less comprehensive list of employments, 5 set no minimum age except for employment in factories and certain dangerous or hazardous occupations, and 2, none except for certain dangerous and hazardous occupations. The various kinds of domestic and personal service, agricultural work and factory work in the home are usually unregulated by child labor laws. In some states canneries are exempt from the operation of the child labor law. . . ."

Agricultural occupations are the most difficult to regulate. While many agricultural tasks are light enough for children, they are often kept at them for periods of anywhere from 8 to 12 hours at a time. Certain types of farm work involve cramped positions for the workers, exposure to dampness and cold, and danger in the use of machinery. Furthermore, there are the migratory farm workers, who travel from place to place, following the crops and seasons, whose living conditions are usually bad, being often unsanitary labor camps. . . .

Inasmuch as child labor is considered to be largely forced by another of the child's enemies, poverty, it is not improbable that an increase of illegal employment of children is occurring at present. In so far as it is possible to bring about a solution of the problems of adult employment, unemployment insurance, and other matters concerned with establishing decent standards of living, general progress toward a reduction of child labor will be made. It is the recommendation of the committee that those concerned with child welfare bear this in mind. On the other hand, many children who have left school to become employed are unable to find work at present, and a more careful observance of school attendance laws will no doubt return many of them to school. . . .

Another suggestion the committee would make is that statistics of injuries to minors be kept more accurately, and separately from other figures, in order that comparable facts may be presented to a public that should be well informed. Most of all, the committee is in agreement with the findings of the White House Conference, that a national minimum standard regulating the employment of minors should be established in order to eliminate the inequalities and injustices existing between the differing laws of the states.

ACCIDENTS

Safety campaigns have been in evidence for some time. The greatest efforts have been directed toward schools, for it is there that the child is most available and open to all kinds of education. In 1931 a *Guide Book for Safety Education*, with a foreword by William John Cooper, U. S. Commissioner of Education, was published with the aim of offering school children, from the kindergarten up, interesting educational material on safety. In larger cities school patrols have become a part of the regular policing function, and in some rural communities they are coming into use.

In spite of the precautions taken, statistics from many parts of the country reveal that the highest average of accidents in any age group is found among children under 16 in trade, and next, among accident-causes, automobiles and other motor vehicles have the highest severity. Machinery has caused the greatest number of accidents it is reported in Illinois, and also in Ohio, among employed minors the past year. The Metropolitan Life Insurance Company states in its *Bulletin* of October, 1930, that of automobile accidents involving 100,027 pedestrians 17 per cent were children struck at play in the streets. . . .

Although a survey, during 1931, of the efforts to prevent crippling in children is both enlightening and encouraging, it does not fail to warn that such advancement as has been made has been at the expense of continual vigilance. The mighty arm of progress must strike here and there at ignorance, carelessness, thoughtlessness, if the day is to be won for the child.

While the report is confined largely to crippling viewed as physical disability of the trunk and limbs, the committee is fully aware that it has much wider implications. Crippling in its widest sense should include children who are seriously malnourished, partially or wholly blind or deaf, and those who have major deformities of the lips, jaws, or teeth. To these might well be added the cardiac cases and those suffering from pulmonary tuberculosis. All of these, however, are considered in detail by other national and local organizations, and much worthwhile literature is available regarding the extent, causes, prevention and cure of disabling conditions.

PUBLIC HEALTH NURSING*

RESULTS OF ELECTION AT THE BIENNIAL NURSES CONVENTION IN APRIL

American Nurses' Association—

Officers

President, Elnora E. Thompson, Portland, Ore.
1st Vice-President, Mabel M. Dunlap, Moline, Ill.
Secretary, Susan C. Francis, Philadelphia, Pa.
Treasurer, Emma M. Nichols, Boston, Mass.

New Directors

A. Louise Dietrich, El Paso, Tex.
May Kennedy, Chicago, Ill.
Elizabeth Soule, Portland, Ore.

National League of Nursing Education—

Officers

President, Effie J. Taylor, New Haven, Conn.
1st Vice-President, Nellie Hawkinson, Cleveland, O.
2d Vice-President, Julie C. Tebo, New Orleans, La.
Secretary, Stella Goostray, Boston, Mass.
Treasurer, Marian Rottman, New York, N. Y.

New Directors

Elizabeth C. Burgess, New York, N. Y.
Katherine Densford, Minneapolis, Minn.
Shirley Titus, Nashville, Tenn.
A. Louise Dietrich, El Paso, Tex.

National Organization for Public Health Nursing—

Officers

President, Sophie C. Nelson, Boston, Mass.
1st Vice-President, Winifred Rand, Detroit, Mich.
2d Vice-President, Mrs. C.-E. A. Winslow, New Haven, Conn.
Treasurer, Michael M. Davis, Chicago, Ill.

New Directors—Nurse Members

Anne Dickie Boyd, Denver, Colo.
I. Malinde Havey, Washington, D. C.
Marian G. Howell, Cleveland, O.
Marguerite A. Wales, New York, N. Y.

New Directors—Sustaining Members

Mrs. Chester Bolton, Cleveland, O.
Mrs. J. L. Brock, Bryan, Tex.
Frank W. Walker, New York, N. Y.

National Biennial Nursing Convention—Even the weather did its best to make the joint biennial convention of the American Nurses' Association, the National Organization for Public Health Nursing, and the National League for Nursing Education, held in San Antonio, Tex., April 11–15, one of the pleasantest as well as one of the most profitable conventions these groups have held. Over 2,600 members and delegates of the three organizations were adequately and comfortably accommodated in San Antonio's spacious new Auditorium, where general meetings were held, and in its interesting and efficient hotels for special group meetings. The exhibits were particularly well planned from the standpoint of service and educational value.

The alleviation and prevention of the serious unemployment with which the nursing profession is faced was the great concern of this convention. The profession will continue to face a serious situation even in normal times due to the annual graduation of many thousands of nurses each year who are not needed. There is now, according to Dr. May Ayres Burgess, 1 nurse to every 63 families in the United States. The question was discussed from many angles, bringing out three suggestions for remedies: the limiting of the out-

* Please send printed matter or other material relating to public health nursing to Eva F. MacDougall, 6 State House Annex, Indianapolis, Ind.

put of nursing schools, the more careful selection of students for the nursing school and the distribution of various kinds of nursing service to meet the needs.

The members of the National Organization for Public Health Nursing are particularly concerned with the training of nurses for public health nursing and their continuous education to meet the ever changing, ever developing demands of the field in which they are working. Do results justify the expense of our staff education programs? Can we maintain the present program? Are organizations assuming responsibility in public health nursing education which should be assumed by the individual nurse? These, according to Ellen Buell, Director of the Department of Public Health Nursing, Syracuse University, are pertinent questions at a time when all community supported projects are being scrutinized as never before.

Much emphasis was placed on the utilization of the help lay people could give us as volunteer workers, board and committee members, and advisory council members for both official and non-official agencies, hospitals, nurses' registries, and nursing schools.

The highlight of the convention was the most impressive service in which Anne W. Goodrich, Dean of the Yale School of Nursing, was awarded, to the great delight of everyone interested in nursing, the Saunders' Medal for distinguished service to nursing.

One could scarcely help feeling throughout the whole convention the stress put on maintaining, in some ways perhaps regaining, that true spirit of nursing which has made it respected and appreciated through the ages.

Certainly no meeting has been more effectively handled than this one. The Texas sunshine, beautiful flowers, the unlimited hospitality of the Southwest, and the well planned and pertinent program made this convention one not to be forgotten for its delight, inspiration and help.

By majority vote of the delegates the next biennial convention will be held in Washington, D. C., in 1934. V. A. J.

A Parochial School Health Bureau—In most of the large cities in the United States the boards of health provide for medical inspection and follow-up of parochial school children—and public and parochial school children receive the same attention and care. Often in rural and semi-rural communities medical and nursing service is given under the jurisdiction of the state board of health either by direct service or through county health units, in which case all children are served alike. In St. Louis the Board of Education and not the Health Department finances the medical inspection in the public schools, and in order to have this service the 104 Catholic parochial schools in city and county have to finance it themselves.

At first, health work in the parochial schools of St. Louis was conducted by volunteer agencies. St. Louis University provided speakers, the Tuberculosis Association promoted classroom health education, and Catholic women's organizations coöperated and aided in these activities. This arrangement brought results, but there was a lack of unity, and finally a Catholic School Health Bureau was formed with representatives from all these agencies on it. The Catholic women's clubs raised the necessary funds and the Superintendent of the parochial schools and the St. Louis University School of Medicine supervised the health program. This bureau, organized in September, 1927, was the first one of its kind in the United States. It was located at the St. Louis University School of Medicine, which gave it not only a central, convenient point from which to work, but also prestige.

A modern complete school health pro-

gram as we know it today was soon outlined and started. The staff consisted of a director, 4 physicians, 2 public health nurses, and 1 office secretary. A little later a social worker was added through the interest of the Daughters of Isabella, a local Catholic women's organization.

In addition to routine medical inspections and follow-up, health institutes for the teaching sisters were arranged and classes in school hygiene, health education, and care of the problem child were held in St. Louis University for parochial school teachers. For these the sisters and teachers received scholastic credit.

A course of study in health for the parochial schools is in process of being written by a committee of sisters in cooperation with the St. Louis University School of Education and the Catholic School Health Bureau.

The bureau has worked very closely with the St. Louis Health Department in communicable disease control. It has carried on a continuous research service also, to ascertain the trend in physical defects and learn the relation between schools, neighborhoods, and racial groups. One survey was made to learn what other Catholic communities are doing for handicapped children in parochial schools, and another to study health knowledge versus health habits of children under the supervision of the bureau. A Children's Dental Clinic for parochial school children was established by the St. Louis University School of Dentistry which has been very successful.

The 4 years the St. Louis Catholic School Health Bureau has been functioning have proved the soundness of its organization and value of its work.—Harvey Smith, Health Work in St. Louis Parochial Schools, *Pub. Health Nurs.*, XXIV, 4: 210–212 (Apr.), 1932.

EDUCATION AND PUBLICITY*

Two **Days of Intensive Study**—Plans are being completed for a Public Health Education Institute to be held immediately preceding the Annual Meeting in Washington in October. Details will be announced next month.

Health **Publicity Awards For 1931–1932**—As announced May 15, public health claimed 4 of the 10 citations for publicity of unusual merit as selected by the Social Work Publicity Council. A committee of 5 met monthly to review the specimens received. The citations for public health material appear below.

The Awards Committee cites for exceptional merit HEALTH OFFICER'S REPORT, MIDDLETOWN, N. Y.:

Because, prepared with the will-to-be-read, it entices laymen into its net as readers, in addition to public health workers.

Because it shows a mastery of mimeographing technic and proves that good taste and effectiveness are not dependent on expensive materials and formality. The illustrations and decorations are deftly done and supply the touch of humor which leavens the whole report. The tailpiece is delightful and the gesture gracious that the able mimeographer has been given the opportunity to sign her work.

Because the text is simple, direct and has a sufficiently informal air to hold the interest its appearance has attracted. Public health workers will find the report of activities substantial in spite of its informality. They may miss, however, information on the size of the community, the size of the staff and organization, and the cost of the health program, helpful facts to have in such a report.

The welfare section of the report is headed with a verse,

> "To cure myself a great dislike,
> Of little trials life brings,
> I simply call a halt and take
> A different view of things."

While the dramatic illustration shows that this refers to the preschool child's attitude toward spinach, it is exactly what the author has done in approaching the usually considered gloomy task of getting the year's work down on paper. He has taken a different view of annual reports.

The Awards Committee cites for exceptional merit "TWO TUBS OF 'CHINY ASTIES'" by Lucretia Penny, Published in *Hygeia,* February, 1932:

Because it shows by the short cut of a delightful story the variety of services crammed into the day's work of a county nurse.

Because all this knowledge can be gained in about 6 minutes of reading time, and the subtle interplay between nurse and client is told with well sustained implication.

Because the young mountain mother, her baby who is the patient, and her stepmother, Miss 'Talithy are flesh and blood. It all sounds real, from the sound of the paling gate swung back into place by a rusty plow point, to the nurse's understanding of the starved lives of tenant farmers.

Because the nurse is shown in her frequent rôle of interpreter of two opposing points of view. In this case a family conflict over some "chiny asties" was depriving the delicate 2-year-old girl of milk from her grandfather's cow. Without taking sides and without apparent efforts to referee, she casually plants seeds of the understanding which later brings the factions together.

Because even the nurse's victory is most disarmingly recorded, just a swift glimpse of the reunited grown-ups on the stepmother's porch, and the little girl bending demurely over the asters, her hands behind her back, as the nurse drives past the cabin on her way home.

(Lucretia Penny is a pseudonym. The author, who is a frequent contributor to *Hygeia,* gained her knowledge of rural communities

* Please address questions, samples of printed matter, criticisms of anything which appears herein, etc., to Evart G. Routzahn, 130 E. 22d St., New York, N. Y.

from living in them, and of the people who live and struggle in them from doing family case work in Tennessee and Kentucky. A friend who was a public health nurse gave her the insight into nursing problems.)

The Awards Committee cites for exceptional merit THE 1932 EARLY DIAGNOSIS CAMPAIGN OF THE NATIONAL TUBERCULOSIS ASSOCIATION:

Because with an event of importance to live up to, the fiftieth anniversary of Robert Koch's announcement of his discovery of the tubercle bacillus, this year's Early Diagnosis Campaign makes history in our field of getting messages over. First of all, it has made good use of the anniversary day, March 24, to introduce its April campaign by newspaper articles of vivid interest.

The publicity kit contained informative material adaptable to all sorts of original plans that showed good team work between national and local associations. Iowa, for instance, localized the Koch story by featuring the doctor's visit to relatives in a little Iowa town, re-using the photographs which appeared at that time in the *Journal of the State Medical Society*.

Because, while the general plan of the campaign is highly praiseworthy for its focusing so intently on the fact that "Tuberculosis Causes Tuberculosis—Every Case Comes from Another," it has an even better point in its favor. The committee feels that the kernel of the campaign's excellence lies in 4 booklets, each written for a special group.

"Closing In On the Old Enemy" is for the health officer; "Where Is the Other Case?" for the physician; "The Adventure of Case Finding" for the public health nurse; and "Why Does It Run in the Family?" for the social worker. Having realized the importance of supplying diversified information to these powerful, highly specialized allies, the association has given them usable material. The booklets, about 10 pages each, are well printed in a conservative but pleasing form which suggests reference material rather than campaign literature.

Because, although the leaflet for distribution to the general public, "Tuberculosis Doesn't Just Happen," falls below the 4 professional booklets in quality, other features of the campaign for use on screen, radio, platform, and display approach them in value. The window poster, for instance, with its big and little cog wheels meshed to convey the inter-relationship between old and new cases of tuberculosis, has the poster prerequisites of good design, simplicity and speed of expression.

The Awards Committee cites for exceptional merit SOLVING THE NURSING PROBLEM IN MILWAUKEE, A Series of Ten Feature Stories in the *Milwaukee Journal:*

Because they tell a readable, comprehensive story in true newspaper style. Considering how factual the articles are, attempting to cover thoroughly all divisions of visiting nurse service, they are popular enough to attract casual page combers. Yet in being popular they have not depended at all on the romantic "angel of mercy" halo with which writers often crown the nurse.

Because the articles have a well thought out plan. Variety has been captured by telling each story from a different angle—one from the observing eyes of the student nurse who sees for the first time the resourcefulness of "old hands at district nursing" as they improvise household makeshifts in lieu of the complete equipment always at hand in a hospital.

Another article is built on the mystery of "What is in the nurse's black bag?" and on the magic of her skill in packing and repacking its numerous and fragile contents.

Because the leads are good, the first being a complete summary of the articles, "A nurse for an hour, a nurse who will skilfully bathe a convalescent, dress a wound, give a refreshing massage, prepare the new baby's formula, or do any other of the numerous things required by a patient in the home who needs expert care at minimum cost is the valuable general service offered by the Visiting Nurse Association."

The second lead, "Eighty-five per cent of the people sick in Milwaukee County are sick at home," stimulates interest in an article on the training of nurses.

Because the illustrations and their captions are a real part of the story. Although the captions are written in a decidedly untabloid style, they do make sure that a reader who glances only at the pictures and their titles will get an outline impression of the services of the Visiting Nurse Association.

War Against Bacteria Dramatized—Some of the adventure, mystery, and excitement of scientific search among the bacteria is given to that kaleidoscopic group known as the radio audience, in a series of 13 radio plays, "The Drama of Science." The Detroit Department of Health presented the series

under the sponsorship of the Detroit Dairy and Food Council. Written by Rex White, a newspaper man and writer of short plays, they were acted by a professional group, the Detroit Players. A smithy anvil, the howls of mad wolves, the horrors of a primitive war hospital, the sounds on a Viking ship at sea, everything, indeed, except the death rattle of the bacteria placed on "the spot," is included in the "sound" effects accompanying the voices.

If there is some over-sentimentalizing of the material, it may be because the planners measured shrewdly the over-sentimentality of the public mind. And in the same way if, along with the convincing emphasis on courage and sacrifice, there was too much thought of the fame that was to come, it may have been a concession to our success-adoring public.

High points in the dramatization include two scenes in the Louis Pasteur episode, 50 years apart:

Louis—I am not afraid, father. (Howl nearer)
Past.—Afraid or not—get in. Smith, swing that great door closed.
Smith—Aye. I wish you had your musket, Neighbor Pasteur. (Door shuts—howl nearer)
Past.—It comes nearer. I swear it's the mad wolf and he's hopping along the highway. He'll run straight along its length and good God protect those who venture in his path. (Howl much nearer)
Louis—Look, father, there he comes. See—by Monsieur the Notary's house.
Smith—It's so. Here, Jules, give me that hammer. Pasteur, take the scythe just in case he veers toward the smithy door. (Howls)
Louis—Oh, father—see. Nicol the peasant. He is filled with wine and he is staggering into the road. Go back, Nicol, go back.
Smith—Back, you drunken fool. (Howls—Barks)
Past.—Do not look, son, do not look.
Louis—I must, father. See, there is the landlord of the inn. He has his pistol.

. . .

Louis—Father—father. What are they going to do?
Past.—The smith will press the white hot iron to the wounds. It is the only hope. Perhaps if he is quick enough he can burn the poisons.

. . .

Past.—Aye. It is white hot. Here are the pinchers, Smith. (Clank of iron)

. . .

Smith—Hold him men—tightly. Don't let him move. The arm first. (Hiss of iron—scream of pain)

. . .

And 50 years later, in Pasteur's laboratory:

Roux—He is the most vicious of all, master.
Past.—Aye, he looks it. His eyes are all but lost in the crimson curtain of their inflammation.
Roux—The poison must be rich in that great throat.

. . .

Past.—Wrap your arms with cloth and wear these gloves.
Roux—But you, master.
Past.—I cannot have my hands made awkward with gloves. I'll need all my finger skill. Roux—raise the gate. I will catch him by the throat.
Roux—Are you sure, master—sure you will not miss? If you do—we all must die.
Past.—Hush—timid one. I will not fail.

. . .

Roux—Are you going to swab the throat? I see no instruments.
Past.—I have—this.
Roux—That? Why that is but a glass tube.
Past.—Aye—it will do.
Roux—But—but—it has no scraping surface.
Past.—No. But it has a hollow stem.
Roux—Master, master, not that. You—you are not going to—to—
Past.—After I have him out, you and Chamberland will hold him and force his jaws apart—wide. You understand? Then I will place the tube into his throat and—draw up the virus.
Roux—Mon Dieu. Master. It is madness. Suppose you miscalculate. One tiny drop of that stuff in your throat—one tiny drop and—
Past.—Hush. Up with the gate. I order you. (Gate draws up—dog snarls—hoarse barks—choking noises)

How colorfully the whole series is done is shown by the different atmosphere in this glimpse of Dr. Jenner's smallpox vaccination experiments:

Jenner—So hast never had a shilling of thy own, boy?

Boy—Nó, sir. I had tuppence once, doctor. 'Twas fair day and I bought me taffy and great baked potato adrip wi' butter and salt.

Jenner—Art a brave boy, James?

Boy—I know not. I am not afeered of Farmer Knowle's black Hereford bull which doth chase the other children—and once, you will remember you did set my arm.

Jenner—Aye—broke stealing apples, as I also remember. It was because you let never a cry from your lips that I have chosen you today. Your father and mother hath given consent.

Boy—Art going to hurt me?

Jenner—Nay—no more than the prick of a pin. See—I will take this little knife and make a very small dot in thy arm—no more than you would get sliding down a tree—or dropping into a blackthorn. And I will give thee a shilling for thy very own. To waste in any manner of gauds you wish. Or to fill that small belly of thine with toffey and ginger beer.

. . .

Jenner—Sarah, my girl—hath the water boiled on the hob?

Maid—Yes. The kettle has been singing fair loud these 5 minutes.

Lady Dorothea—What are you going to do?

Jenner—I am going to inoculate the lad with the virus of cowpox—from the hand of Sarah. And 6 weeks from now I will inoculate the same boy with smallpox virus.

Lady D.—Inoculate? You mean put the poison of the pox into his blood?

Jenner—Exactly. I have found by careful study that those who have the cowpox—a minor ailment—never get the smallpox. Why? I do not know. But with this boy I am going to prove my knowledge. . . .

Among the episodes besides the findings of Pasteur are the discovery by Roux, his pupil, of the diphtheria antitoxin; by Lister, of the safety of surgery; Florence Nightingale fighting not only sepsis in neglected wounds, but the stupidity of the War Department; and the closing down on the yellow fever mosquito by Reed and Carroll.

In each episode there is just enough continuity to connect the drama with our own lives of today, and the last of the series dramatizes a diphtheria experience which had recently occurred in Detroit.—Hilary Campbell.

We plan to follow the above review, from a non-health worker, by comments from several in the field of health. They will discuss the factual material as well as the dramatic setting of these dramatizations.

Copies of the Radiodramas will be supplied upon request to Dr. Henry C. Vaughan, Department of Health, Detroit. Comment should be sent to editor of this department.

BOOKS AND REPORTS

A Doctor of the 1870's and 80's—*By William Allen Pusey. Springfield, Ill.: Charles C. Thomas,* 1932. Price, $3.00.

The name of William Allen Pusey as author of any book would attract attention. He has now given us the story of his father's life and practice in a small town in middle Kentucky. He was the old-time country doctor, going over roads in the old fashioned buggy or on horseback in every sort of weather. All persons, regardless of their circumstances, received the same conscientious and kindly attention. Though the surroundings described are widely different, one is constantly reminded of "A Doctor of the Old School."

Dr. Pusey has given a worthy tribute to a loved parent from whom he gained much and to whom he owed much. For the general reader, perhaps the most interesting part of the book is Chapter X, entitled "Appraisal," in which the author discusses the question as to whether those who, like his father, stick to the country in spite of all of its hardships, or the physician of the present day who practises in a city with companionship and all conveniences and assistance constantly at hand get the most out of life. In the following words he sums up the advantages and disadvantages, and concludes in favor of the country doctor:

> Things of the sort I have tried to indicate were the compensations for the hardships of the country doctor's life, as Pusey lived it—the satisfactions of a life of useful service, and, as a result of that, economic and spiritual independence and the gratitude and esteem and affection of those he served. A man can hardly hope for more in this world. If he can gain these in an occupation that is interesting and stimulating, that keeps him in the open, that gives him an opportunity for close and abundant association with his family, he has about as much as life offers; and all these Pusey had. The balance in favor of such a life, I should say, is large.

In those who have lived such a life or who have come into contact with such a man, the book will touch a most responsive chord. To the younger practitioners who must have tiled floors, beautiful nurses, and an abundance of dressings, towels and expensive paraphernalia of all sorts even to open a boil, we especially recommend the book as a picture of the type of men who made American medicine.

MAZŸCK P. RAVENEL

Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists. (*3d ed.*) *Washington: Association of Official Agricultural Chemists,* 1931. 593 pp. Price, $5.00.

For the past 10 years public health laboratories have relied on these methods in connection with chemical analyses of foods and drugs. To what extent this work, aside from that necessary for control of dairy products, is properly a function of a public health laboratory, may be seriously questioned, but when such analyses are made it is just as necessary for a public health laboratory to follow recognized "official" methods as it is for the state or government regulatory laboratory. This third edition is very welcome to all concerned.

It would be absurd to attempt a detailed review of a book containing hundreds of methods of analysis. Revisions of old methods and approval of new

ones are made by the association sponsoring these procedures, only after a reasonable amount of publicity. Hence, those chemists most concerned already have been informed of prospective changes. Laboratory workers will await with interest the projected methods involving such subjects as vitamins and bacteriological procedures. The compilers are to be congratulated on the indexing and reference numbers, which will be appreciated by the very large number of chemists who use the book.

JOHN F. NORTON

Nursing Education: A Survey of Day Nurseries, Nursery Schools, Private Kindergartens in the United States—*By John E. Anderson, Ph.D. A publication of the White House Conference on Child Health and Protection. New York: Century,* 1931. Price, $2.00.

This volume is based upon an extensive study of schedules from 1,275 institutions caring for the preschool child in which a total of 49,358 children were enrolled, and upon a study of 2,757 families with over 4,000 children.

The Committee on Education and Training of Infant and Preschool Children had two main projects: (1) A survey of institutions for the education and training of young children, and (2) The study of young children in the home. Only the first of these is considered in this volume.

The report covers the most comprehensive survey of day nurseries, nursery schools, and private kindergartens ever carried out in this country. These institutions are the ones in our country having the largest contact with preschool children.

We have long known a great deal about the infant and the child of school age, but it has been very difficult to secure authentic information regarding the preschool children of whom there are over sixteen million in the United States. The present survey will help us to evaluate better the functions of the preschool child agencies and their place in modern society.

The book opens with a historical résumé of organized care for young children, and discusses briefly the various types of institutions.

The method of obtaining data is described, and a detailed classification as to type and geographical location given. Typical and selected institutions are discussed. This is followed by a very informative chapter on auspices, support, tuition, and purposes.

Another chapter deals with the number of children cared for in any one institution, sessions, and attendance.

Of special interest to the health officer is the chapter on medical facilities which includes medical inspection, physical and dental examinations, vaccination, immunization, diet, dietitians, etc.

The educational facilities and program receive considerable attention.

Specific recommendations are given, as well as general findings. The appendix contains a copy of the questionnaire used in the study and a geographical list of the contributing institutions.

The same high quality of printing is maintained as in all other publications of the White House Conference.

RICHARD A. BOLT

Diphtherieepidemien der letzten Jahre, das Heilserum und die Schutzimpfung—*By E. Friedberger. Aus dem Forschungsinstitut für Hygiene und Immunitätslehre, Berlin-Dahlem. Berlin and Vienna: Urban and Schwarzenberg,* 1931. 50 pp., 56 figs.

Dr. Friedberger, in his monograph on diphtheria epidemicity, has made use of interesting data both statistical and experimental. His work is not so much a criticism of present-day methods for the control and prevention of this dis-

ease as a plea for more careful study of these methods, keeping in mind the fact that all infectious diseases move normally in cycles and that disease and population composition mutually affect each other.

He states that diphtheria is a disease which experiences periods of great dissemination which alternate with periods of almost complete disappearance. It reached its height in Central Europe about the middle of the 80's and then fell with remissions until after the Great War. The decrease, especially since the beginning of the 90's, has been attributed to the introduction of antitoxin without considering the normal decline.

Behring gave to the medical world the idea of active immunization but it was in the United States that this was worked out with great energy and vigor. It appears that since then diphtheria has diminished considerably in America while in Germany it has greatly increased. It is impossible, however, to conclude that this decrease was due to the measure of control alone. Since 1924, both in the old and new worlds, the idea of diphtheria prophylaxis and therapeusis has become so firmly established that the following relationships seem apparent: the United States with much protective immunization has little diphtheria while Europe with little protective immunization has a great deal.

If these associations are based on cause and effect, immunization should be practised in Europe and diphtheria should then decrease as in America. Differences in economic conditions in the two hemispheres during the last 20 years must be considered before this assumption may be made. Gottstein pointed out the fact that antitoxin was first employed during the descending phase of a natural wave of diphtheria incidence. He was able also to explain fluctuations on the basis of increased natural immunization because of latent infection of alternate generations. He asserted that the real test of diphtheria prophylaxis and therapy would come when the infection again began to ascend naturally.

Morbidity and mortality have increased greatly in Germany but the fatality rate has decreased. The increase of diphtheria is not as yet in the nature of a general epidemic but is localized in certain focuses, Berlin, Rhineland-Westphalia, Koenigsberg, Breslau, etc. The focuses are well scattered and the mortality is highest in large cities. In Leipzig (1910) and in Hamburg (1911) similar focuses occurred. The failure of serum treatment at that time was said to have been because of the low unit value, insufficient doses, and delayed administration. The same failure is being observed at the present time when these explanations do not hold.

Friedberger closes with the statement that because of the great concentration on the theoretical aspects of serum therapy there has been an unwarranted application of laboratory results to human experience. By the collection of epidemiological data concerning diphtheria incidence, therapy, and protective immunization, new avenues of approach to control measures against diphtheria should be made possible.

E. L. LUCIA

Gynecology and Urology for Nurses —*By Dr. Samuel S. Rosenfeld. New York: Wood,* 1931. 230 pp. Price, $2.00.

At the National League of Nursing Education in Atlanta, 1931, Dr. May Ayres Burgess made a plea for simpler nursing textbooks. This seems to be one of the strong points in Dr. S. S. Rosenfeld's new book.

The first three chapters cover briefly and concisely the anatomy, physiology and pathological conditions of the female genital tract. These serve as a good background for the procedures,

medical and surgical, which are covered next.

The illustrations are clear-cut and not so numerous as to be confusing.

Operative procedures described are the ones most commonly met, and the student is not bewildered by a multitude of variations.

The chapter on Urology might be considered a bit too brief. The pathological conditions are clearly described, but the operative measures will need to be supplemented by well planned lectures.

On the whole, the textbook should prove valuable for use during the course of gynecology and urology, and also as a worthwhile addition to the reference library. JESSIE L. GROVES

Essays on Marriage—*By Frederick M. Harris. New York: Association Press,* 1931. 208 pp. Price, $2.00.

The late Frederick Harris, of the national staff of the Young Men's Christian Association, left unfinished manuscripts which the editor, Professor Harrison S. Elliott, has arranged in ten very interesting and thought provoking essays regarding present-day problems of marriage.

The chapters deal with the present status and attitudes, marriage customs, marriage a partnership, conjugal affection and sexual desire, results of ignorance and silence, choice of a mate, and limitation of families. The book will be useful to discriminating advisers and counsellors who deal with personal problems in the matrimonial field and to critical readers who are advanced in their studies in family sociology; but for the rank and file of general readers who need some guidance in preparation for marriage, these essays will suggest more problems than they will solve.

Note that the book is recommended to "discriminating" counsellors and "critical" students. This is so because the essays are, in spots, uncritical and unscientific, certain authors quoted are not worth the space, some advice given is highly debatable, and many good points get lost in a wilderness of words. In short, the book as a whole is not for the beginner in matrimonial literature, but interesting and stimulating for one who already knows enough to pick and choose the paragraphs where the author is on solid ground.

M. A. BIGELOW

The Essentials of Swimming Pool Sanitation—*By C. A. Scott, P.B.E. Chicago: Published by Author,* 1931. 126 pp. Price, $1.00.

Swimming pool managers, public health officials, and others having to do with the operation of swimming pools have long felt the need of a book to which they could turn for information when they were in doubt as to some question of sanitary practice. This need the author has attempted to supply by telling in his own language some of the facts and principles which have been hidden in the various reports of the Joint Committee on Bathing Places of the Conference of State Sanitary Engineers and the Public Health Engineering Section of the American Public Health Association.

After a short homily on the passing of the old swimming hole and its replacement by the modern swimming pool with its complicated equipment for purification and disinfection, the author proceeds with discussions of the bacteriology of swimming pool water and of the methods for making bacteriological examinations and their significance. The bacteriological procedures recommended generally follow the *Standard Methods for Water Analysis.* There are, however, some discrepancies, as, for example, in the use of dextrose broth for making fermentation tests which was discarded as standard practice some 20 years ago. The erroneous statement that the standard limits for

numbers of bacteria in pool waters are the same for counts made on agar plates incubated at room temperature and at body temperature can probably be attributed to careless proof reading.

The real meat of the book is contained in 3 chapters: Removal of Objectionable Matter, The Filter and Its Operation, and Sterilizing the Water, in which the different types of apparatus for cleaning the pool, and the equipment for keeping the water clean and safe are described and their operation is outlined.

Suggestions are given for the care of the floor and walls of natatoriums. A schedule is outlined covering the operator's daily routine for cleaning the pool, inspection and maintenance of the filter and sterilizing equipment, and for making the necessary chemical tests of the water, for which the methods are described fully. A section on trouble shooting should be very helpful to the operator whose filtration system fails for some unknown reason to function properly. The directions for first aid treatment for chlorine exposure are also useful although the probability that they may be needed is rather remote.

In his discussion of methods for sterilizing the water the author takes issue with the Joint Committee on Bathing Places for their failure to approve other methods than chlorination, and presents in some detail the advantages claimed by manufacturers of ultraviolet ray and ozone equipment.

The final chapter treats of the methods for submerged lighting of pools, a subject which is just beginning to come into prominence. Notes at the end of the book contain miscellaneous information on the requirements for pool marking for swimming meets, official dimensions and height of spring boards, etc., which will help the owners in making the pool useful to the public.

Unfortunately there is a lack of coordination in the arrangement of the subject matter, in numerous cases important topics being introduced into the discussion of unrelated subjects. In the absence of either a table of contents or an index this makes difficult the use of this book as a handbook or work of reference, which is its stated purpose. Nevertheless it fills a gap in the literature of public sanitation which has long been conspicuous and should therefore find a ready welcome by public health officials as well as those who own and operate swimming pools.

STEPHEN DEM. GAGE

Cancer and Race: A Study of the Incidence of Cancer Among Jews —*By Maurice Sorsby. New York: Wood,* 1931. 120 pp. Price, $3.00.

Dr. Sorsby has produced one of the most interesting books on cancer which have appeared for a long time. In spite of the fact that its scope is limited to a statistical study of the incidence of cancer among Jews as compared with the incidence among others living in the same environment, and to a consideration of the factors which may account for the differences found, the volume is one which no serious student of the prevalence of cancer can afford to be without. It is the outcome of a paper which the author read at the international conference on cancer in London, 1928, in which the comparative freedom of Jewish women from cancer of the uterus was attributed to their habits of sexual hygiene.

In this book the author sets out to see, first, whether there is any material difference between the mortality from cancer among Jews and others. He chooses for his data a number of cities of large size which offer the most reliable statistics obtainable for such an inquiry—London, Amsterdam, Vienna, Budapest, Warsaw, Lodze, and Leningrad. The buccal cavity, penis, breast, uterus, ovaries, and gastrointestinal tract are the sites considered.

Contrary to the view once held, it is

found that the total incidence of cancer among Jews follows closely its incidence among other citizens. There is a closer parellel between the Jews and non-Jews of any city than between the Jews of different cities. The author concludes that there is no evidence of a Jewish immunity.

Some organs are more, some less, affected in Jews as compared with non-Jews, and in certain respects these differences are remarkable. The reasons are not clear.

Fatal cases are comparatively rare among Jews in cancer of the buccal cavity, penis, and uterus. The rarity of syphilis among Jews seems to account for the first, circumcision for the second, and certain practices of a hygienic nature required of Jewish women by their religion for the third. Cancer of the breast was found to be neither more nor less prevalent among Jewish women than among others. Ovarian cancer occurred more often in Jewesses, but the number of instances recorded was not large enough to warrant any interpretation. Cancer of the gastro-intestinal tract and especially of the intestines was decidedly more frequent among Jews. The author finds it difficult to account for the excess of gastro-intestinal cancer among Jews, but offers several possible explanations.

It is interesting to observe that Dr. Sorsby does not seem to consider the possibility that a racial factor may exist and manifest itself in a characteristic organ susceptibility or resistance, and yet this is possible. It is entirely reasonable to suppose that Jewesses inherit an unusual resistance toward cancer of the uterus and an unusual susceptibility to gastrointestinal cancer.

In view of the large amount of labor which he has put upon his excellent research, it is curious to note that the author seems to see only one possibility in the way of a racial peculiarity: apparently he thinks that if Jews are more or less susceptible to cancer than non-Jews, this fact should make itself apparent in all the organs of the body.

It should be remarked in passing that Dr. Sorsby, like practically every other investigator in his field, assumes that, in cancer, "incidence" and "mortality" are interchangeable terms.

These criticisms by no means detract from the value of the book. Rather, they point to an extension of this particular field of inquiry. No kind of cancer research is so commonly attempted, and, as ordinarily conducted, so incompetently handled, as statistical and epidemiological investigation. A prospect of genuine service lies ahead of really qualified workers in this field.

GEORGE A. SOPER

Tumbling Illustrated—*By L. L. McClow. Illustrated by D. N. Anderson. New York: Barnes,* 1932. 212 pp. Price, $3.00.

This profusely illustrated book on tumbling, containing in 212 pages some 666 different exercises, is designed for the use of physical education teachers who may wish to give instructions in tumbling, and also for the use of individuals who wish to find new exercises or to perfect themselves in this phase of physical activity.

Tumbling has for many people a life-long interest, it "is not a temporary fancy, but a life-long interest from early childhood to old age. Evidence of this is seen on the bathing beach, the lawns or in the gymnasiums, where all ages will attempt such stunts as the cartwheel or standing on their heads and hands." These exercises are grouped under certain major headings: individual; couples' exercises; one performer and thrower, etc.; and are graded as to difficulty. The exercises are named and very instructively illustrated by line drawings which are followed by hints as to procedure in an effort to render the exercise easier.

For those teaching or interested in tumbling this would be a very desirable work, and probably is, at present, the most complete of the descriptive texts in this field. CHARLES H. KEENE

Handbook of Tropical Fevers—*By N. P. Newell, M.D., and W. H. Kauntze, M.D., New York: Wood,* 1932. 285 pp. Price, $6.00.

The authors have given us an unusually interesting book on the subject of tropical fevers, based on an experience which commands respect and attention. In addition to this, they have consulted the best authorities on tropical diseases throughout the world. One naturally feels some hesitation in reviewing such a book, as many of the diseases are practically unknown in the temperate zones or occur so rarely that few people have had any experience with them on which to base opinions.

The authors treat blackwater fever as a special disease, but express their belief that at least 2 and perhaps 3 diseases have been confused under this general name. While stating that the etiology of the disease is uncertain, they lean to the opinion that subtertian (*estivo-autumnal*) malarial infection is the primary factor. Quinine is ruled out on the very just ground that blackwater fever was recognized by Hippocrates, long before quinine came into use. However, they admit that in some cases quinine may produce hemoglobinuria, and give a case which came on after administration of 5 grains of the drug, which resulted fatally.

The most serious criticism of the book is that in spite of the long list of authors quoted, there is a notable absence of Americans. In this country we are inclined to think that Americans, and especially the Army Commission, had much to do with the clearing of the etiology of breakbone fever. In the 18 pages devoted to yellow fever, no mention is made of the name of Carlos Finlay—which he surely deserves. In this connection, we are glad to note, however, that Noguchi's error in believing that the *Leptospira icteroides* was the cause of the disease is corrected. The name of no American is mentioned in the chapter on bubonic plague, though we are accustomed here to believe that very important work was done, especially in connection with the pneumonic type of the disease, by Teague and others. Altogether, the book is up-to-date, interestingly written, and correct as to facts. The printing and make-up are excellent.

MAZŸCK P. RAVENEL

Communicable Diseases for Nurses—*By A. G. Bower, M.D., and E. B. Pilant, R.N. (2d ed.) Philadelphia: Saunders,* 1932. 358 pp. Price, $3.00.

This book shows the practicality of having a physician and a nurse collaborate in writing a textbook for nurses. The first part, which deals with definitions of terms in communicable diseases, medical aseptic technic, and care of communicable disease in the home, probably could not be improved upon for clarity and completeness.

The different communicable diseases are then dealt with very effectively and completely under the headings of definition, analogy, mode of infection and conveyance, immunity, symptoms, complications and sequelae, prognosis, treatment, and nursing care.

In the chapter on rabies under diagnosis, however, the authors state that if a dog is obviously rabid it should be immediately killed and the diagnosis confirmed by either finding the Negri bodies in its brain or by inoculating some of this brain substance into other animals. Why take a second animal when the one under observation will serve as a laboratory animal? An animal living through the ordeal will prove himself non-rabid. If a person is bitten

on the face start Pasteur treatment immediately and wait for diagnosis. If it proves negative stop treatment; no harm has been done.

It is disappointing to find Vincent's angina and ringworm so briefly mentioned, each in a paragraph describing another disease. Where do scabies, athletic foot, and pediculosis come in? All these diseases except athletic foot are on the list in "Standard Regulations for the Control of Communicable Diseases," published by the American Public Health Association, and they are serious problems to nurses in the public health nursing field who can never find information enough about them.

The book is excellent. Nurses, mothers and perhaps the physicians need it. Its only sins are those of omission. EVA F. MACDOUGALL

Mental Healers—Franz Anton Mesmer, Mary Baker Eddy and Sigmund Freud—*By Stefan Zweig. New York: Viking Press,* 1932. 363 pp. Price, $3.50.

The author, who says that he is not a mesmerist, a Christian Scientist or a psychoanalyst, and is not moved to write about these subjects through his fanatical belief in the efficacy of any of them, nor through gratitude, has given us an exceedingly interesting study of 3 outstanding characters who he believes while "going their several ways, have worked upon the same principle and brought healing to hundreds of thousands—Mesmer, by means of suggestion, strengthening the will-to-health; Mary Baker Eddy, by the anesthetic ecstasy of faith, conjuring pain and sickness out of the world; Freud, by rendering the patient aware of the conflict that burdens the unconscious and thus enabling him to escape its spell." He evidently believes strongly in the influence of the mind on the body but in his analyses seems to leave out of consideration the fact that many of the so-called healed people were not sick physically to begin with.

The life histories of the 3 persons selected follow the usual lines and are accurate according to the testimony of authorities. In treating of Mrs. Eddy, he goes more into her love of money and eagerness to collect it than many others do. We confess it rather jars us to have the name of a great man like Freud considered along with the other two, and especially Mrs. Eddy. Mesmer and Freud have taught us much which is worthwhile. Mrs. Eddy has certainly revealed a twist of the human mind which is astonishing and does not tend to strengthen our faith in the average of the intellectual level.

Though we have not seen the original, we judge that the translation is excellent. Certainly the English is good and has been put into a most interesting and readable form. The book can be read by any educated person with pleasure as well as profit. Specialists doubtless can detect flaws not evident to the average reader.

MAZŸCK P. RAVENEL

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

Complicating the Diphtheria Picture—"The conclusions drawn from a survey of diphtheria in Leeds in recent years, . . . are as follows: (1) There are two forms of diphtheria bacillus. (2) The *B. diphtheria gravis* is associated with severe toxic cases. (3) The *B. diphtheria mitis* is associated with milder cases of the disease. . . . (4) The increased virulence of diphtheria in Leeds is due to an increased prevalence of *B. diphtheria gravis*."

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ANON. State Health Commission Completes Its Work. Health News (New York State Dept. of Health), 9, 14: 53 (Apr. 4), 1932.

Smallpox Trends—Statistical evidence in support of the statement that: "The efficacy of smallpox vaccination . . . is shown by the progressive decline . . . in central and eastern Europe where vaccination has become general, while the disease . . . spreads in England and the United States where vaccination is not in fact universally compulsory."

ANON. Trend of Smallpox Incidence in Civilized Countries. Pub. Health Rep., 47, 15: 837 (Apr. 8), 1932.

Typhoid Fever in 1931—The total typhoid rate for the large cities (over 100,000 population) is almost the same as for the two preceding years. Twelve of the 93 cities had no deaths, the largest number so far recorded.

ANON. Typhoid in the Large Cities of the United States in 1931. J. A. M. A., 98, 18: 1550 (Apr. 30), 1932.

All That's Wrong with Public Health—The author at his best—and worst. If his indictment of health administration is half true, it is a serious charge indeed. The trouble is, it isn't. The particulars which he advances may be in part the truth, but the general impression left by the story is not. The paper, however, will delight *Mercury* readers, and infuriate a few health workers. The author completes his picture by labelling health officials "communistic radicals" than which nothing could be more completely damning.

CLENDENING, L. Hygeia vs. Aesculapius. Am. Mercury, 26, 101: 28 (May), 1932.

Health Examinations—The history of the present ambitious health examination program in New York City holds much of interest to all who are concerned with health promotion.

GALDSTON, I. The Health Examination Idea. Millbank Quart. Bull., 10, 2: 81 (Apr.), 1932.

Virulence of BCG—A British research worker inoculated BCG into guinea pigs, monkeys, rabbits and goats, producing lesions which tended to heal, the bacilli within them dying out. His conclusions are: "The results of my investigations support the contention of Calmette that BCG may be used as a vaccine without risk of causing progressive lesions."

GRIFFITH, A. S. A Study of BCG Strain of Tubercle Bacillus. Lancet, 222, 4: 303 (Feb. 6), 1932.

Undulant Fever—An excellent summary of the whole subject of undulant fever covering etiology, symptoms, diag-

nosis, treatment and epidemiology for those who have not kept abreast the voluminous literature on this topic.

HASSELTINE, H. E. Undulant Fever. Pub. Health Nurs., 24, 4: 181 (Apr.), 1932.

Possibilities of Scurvy—Although scurvy is seldom seen, due to the general dietary improvement, it is quite possible, if not probable, concludes the author, that economic conditions here and abroad may entail a return of scurvy both in infants and older persons.

HESS, A. F. Recent Advances in Knowledge of Scurvy and the Anti-Scorbutic Vitamin. J. A. M. A., 98, 17: 1428 (Apr. 23), 1932.

Dried Lactic Acid Milk—The clinical results of a comparative feeding study indicate "that dried lactic acid milks can be used under the same conditions as cultured sweet milk and cow's milk plus U. S. P. lactic acid."

HESS, J. H., *et al.* Dried Lactic Acid Milks as a Long Continued Diet for Infants. J. A. M. A., 98, 15: 1250 (Apr. 9), 1932.

Koch's Historic Demonstration—The dramatic story of Koch's demonstration of the tubercle bacillus precedes a translation of his original paper, a truly historic document. Every health library should have a reprint.

KRAUSE, A. K. Introduction to the Aetiology of Tuberculosis. Am. Rev. Tuberc., 25, 3: 285 (Mar.), 1932.

The Improvement of Industrial Medicine—The faults as well as the possibilities in industrial medicine are set forth in frank detail. A plea for better industrial hygiene is made.

MCCORD, C. P. The Economics of Industrial Medicine. J. A. M. A., 98, 15: 1238 (Apr. 9), 1932.

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MELLANBY, M., and PATTISON, C. L. Influence of a Cereal-Free Diet Rich in Vitamin D and Calcium on Dental Caries in Children. Brit. M. J., 3715: 507 (Mar. 19), 1932.

Vitamin-Less Cod Liver Oil Products—After reading this report, our faith in cod liver oil substitutes will suffer. Of 17 brands of tablets tested, only 2 were found to contain therapeutic quantities of vitamins A and D. Unfortunately, these two are not named. Of 7 brands of capsules, 2 only filled the bill. Of 28 "hydro-alcoholic" preparations, none had significant quantities, though there was plenty of alcohol! Of 7 concentrates, 3 met the test.

NELSON, E. M., and WALKER, R. Vitamin Content of Medicinal Cod Liver Oils and Related Products. J. A. M. A., 98, 15: 1263 (Apr. 9), 1932.

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OSBORN, S. H. Problems and Opportunities in Public Health and the Relation of Practising Physicians Thereto. New Eng. J. Med., 206, 17: 877 (Apr. 28), 1932.

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PRODAN, L. Cadmium Poisoning: The History of Cadmium Poisoning and Uses of Cadmium. J. Indust. Hyg., 14, 4: 132 (Apr.), 1932.

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SYDENSTRICKER, E. Statistics of Morbidity. Millbank Quart. Bull., 10, 2: 101 (Apr.), 1932.

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THE FINE ART OF LIVING. By Daniel S. Sager. Philadelphia: Dorrance, 1932. 215 pp. Price, $2.00.

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NUTRITION SERVICE IN THE FIELD. Child Health Centers: A Survey. Publication of the White House Conference. New York: Century, 1932. 196 pp. Price, $2.00.

MANUAL OF PUBLIC HEALTH NURSING. 2d ed. National Organization for Public Health Nursing. New York: Macmillan, 1932. 253 pp. Price, $1.50.

DIET AND WEIGHT CONTROL. By Shirley W. Wynne. New York: Liveright, 1932. 223 pp. Price, $1.00.

NORMAL YOUTH AND ITS EVERYDAY PROBLEMS. By Douglas A. Thom. New York: Appleton, 1932. 368 pp. Price, $2.50.

THE YOUNGEST OF THE FAMILY. By Joseph Garland. Cambridge: Harvard University Press, 1932. 196 pp. Price, $2.00.

MICROSCOPIC SLIDE PRECIPITATION TESTS FOR THE DIAGNOSIS AND EXCLUSION OF SYPHILIS. By B. S. Kline. Baltimore: Williams & Wilkins, 1932. 99 pp. Price, $2.50.

HUMAN STERILIZATION. By J. H. Landman. New York: Macmillan, 1932. 341 pp. Price, $4.00.

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NEWS FROM THE FIELD

ADDITIONAL SUMMER SCHOOL COURSES

INFORMATION from the two following colleges came too late for the May issue. We therefore mention them for those interested.

University of California, Los Angeles, Calif.

June 27–August 6

Elementary Epidemiology
Elementary Public Health
School Hygiene
Procedures in Health Education
Principles and Practice of Public Health Nursing
Administration of Schools of Nursing
Supervision in Schools of Nursing

Washington University, St. Louis, Mo.

June 17–July 29

Principles of Public Health Nursing
Family Health

PENNSYLVANIA PUBLIC HEALTH ASSOCIATION

THE Pennsylvania Public Health Association had its annual meeting on May 26 and 27, in Pittsburgh. Many important papers were presented, including one on "The Advantages of a Municipal Health Center" by Charles B. Crittenden, M.D., Director of the Angeline Elizabeth Kirby Memorial Health Center, Wilkes-Barre; "Health Conservation in Middle Age" by Victor G. Heiser, M.D., of The Rockefeller Foundation, New York; and an address on "Adventures in Health Education" and the "Shanghai Cholera Parade" moving pictures by W. W. Peter, M.D., Director of the Health Bureau of Cleanliness Institute, New York.

SOUTH CAROLINA PUBLIC HEALTH ASSOCIATION

THE annual meeting of the South Carolina Public Health Association was held April 19 at Columbia, S. C. The officers elected were: John B. Setzler, M.D., Columbia, S. C., President; Laura Blackburn, R.N., Columbia, S. C., Vice-President; and Lois Orr Preach, R.N., Anderson, S. C., Secretary-Treasurer.

PENNSYLVANIA SEWAGE WORKS ASSOCIATION

THE Pennsylvania Sewage Works Association will hold its Sixth Annual Conference at State College, Pa., on June 22–24. It will follow the Conference of the Pennsylvania Water Works Operators' Association, to be held on June 20–22. Among the subjects to be discussed are: the new Allentown sewage treatment plant—shown in motion pictures—and that at Erie; "Sludge Digestion Experiences at Baltimore," "Explosion Hazards of Gas from Sewage Sludge Digestion Tanks," and "Insect Control."

ANTI-MOSQUITO MEETING

THE Tenth Annual Meeting of the Florida Anti-Mosquito Association was held at Clearwater, Fla., March 14 and 15. The U. S. Public Health Service and the A. P. H. A. were represented by Dr. T. H. D. Griffitts, and the U. S. Department of Agriculture had as its representatives Entomologists McNeel and Hull. The Georgia State Board of Health sent its Chief Engineer, L. M. Clarkson.

The program was interesting and varied, covering the problems of mosquito, malaria and sand-fly control. Progress reports were presented by the three Mosquito Control Districts of Florida and by the Taylor County Health Unit of the state.

The meeting was attended by repre-

sentatives of the Florida State Board of Health and others interested.

CHILD LABOR CONFERENCE

THE National Child Labor Committee held its 27th Annual Conference in Philadelphia, Pa., on May 17. The general subject was Child Labor and the Schools in a Depression Period.

FREE HOSPITAL SERVICE

AT the annual distribution luncheon of the United Hospital Fund, in New York on May 9, a total of $575,000 was presented to the presidents of the 55 associated hospitals, representing the share of each in the proceeds of the public collection for the provision of free hospital service, apportioned among them on the basis of free service rendered during the preceding year. The reports for 1931 show that the 55 hospitals gave a total of 1,752,998 days of free care in their wards; of this total, 1,043,000 days were credited to the 29 general hospitals and 709,998 to the 26 special hospitals. The free visits to the Out-Patient Departments of these hospitals increased 17 per cent over those of 1930.

TWINS

IN every 50 live births in Maryland, in 1931, there was an average of one set of twins. The total number of live births recorded was 28,705. This number includes 298 sets of twins—596 children—or 2 per cent of the total. The ratio was the same for Baltimore City, and the counties, for both white and colored races. The report of the U. S. Bureau of the Census, for births for 1928, the latest period for which complete records are available, gives a total of 2,233,149 births in the U. S. Birth Registration Area, comprising 94.4 per cent of the total population. There were 23,863 sets of twins—47,726 children, or 2 per cent of the total. These figures, like those for Maryland, do not include the plural births in which one or both children died. These figures indicate that one set of living twins was born to each one hundred mothers.

EYE COURSES

THE National Society for the Prevention of Blindness plans to sponsor, next fall, two courses for medical social service workers in eye hospitals and clinics. The society will coöperate with Washington University, St. Louis, and the Massachusetts Eye and Ear Infirmary, Boston, in giving these courses which will probably extend through a period of 16 weeks. A few scholarships may be available later. Those interested should communicate with Eleanor P. Brown, Secretary of the National Society for the Prevention of Blindness, 450 Seventh Avenue, New York, N. Y.

PERSONALS

C. HAMPSON JONES, M.D., Health Commissioner of the City of Baltimore, died April 11 in his 74th year. Dr. Jones was associated with the Baltimore Health Department since 1896, with the exception of the years 1915 to 1919. He has served as Commissioner of Health for 14 years. He was a member of the A. P. H. A. since 1915 and was made a Charter Fellow in 1922. He served the Health Officers Section as Vice-Chairman, 1926–1927, and as Chairman, 1927–1928, and was a member of the Governing Council of the Association, 1923–1924.

HARRY E. RANSOM, M.D., was appointed City Health Commissioner of Des Moines, Ia., to succeed Harley L. Sayler, M.D. Doctor Ransom is very well qualified to serve as chief of the health department by virtue of many years of service as an assistant to former commissioners.

CONFERENCES

June 2–3, State and Provincial Health Authorities of North America, Washington, D. C.

June 2–3, State and Territorial Health Officers Conference, Washington, D. C.

June 6–9, National Tuberculosis Association, Colorado Springs, Colo.

June 9–11, Third Annual Meeting, Western Branch, American Public Health Association, Denver, Colo.

June 20–22, Pennsylvania Water Works Operators' Association, State College, Pa.

June 22–24, Sixth Annual Conference of the Pennsylvania Sewage Works Association, State College, Pa.

June 28–30, Conference of Health Officers and Public Health Nurses in New York State, Saratoga Springs, N. Y.

July 9–16, Royal Sanitary Institute, Brighton, England.

July 21–29, 100th Anniversary Meeting, British Medical Association, London.

July 25–30, Regional Conference of the World Federation of Education Associations, Honolulu, Hawaii.

September 6–9, International Union Against Tuberculosis, The Hague.

September 12–19, American Hospital Association, Detroit, Mich.

October, 1932, Meeting of the Health Committee of the League of Nations, Geneva.

October 3–7, Twenty-first Annual Safety Congress and Exposition, Washington, D. C.

October 24–27, 61st Annual Meeting, American Public Health Association, Washington, D. C.

November 14–18, Tenth Annual Short School, Texas Public Health Association, Dallas, Tex.

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